CLIMATE RESPONSIBLE AGRICULTURE FOR LATVIA

AFTER-LIFE PLAN

2024

LIFE CRAFT: Climate Responsible Agriculture for Latvia
LIFE16 CCM/LV/000083

Abbreviations

AB – Associated beneficiary

CAP – Common Agricultural Policy

CAP SP – Common Agricultural Policy Strategic Plan

CB – Coordinating beneficiary

CCSS – Czech Center for Science and Society

CDS – Controlled drainage system

IES – Institute for Environmental Solutions, project partner

GA – Grant Agreement

GHG - Greenhouse gases

KPI – Key Performance indicators

LFN – Latvian Fund for Nature

LRATC – Latvian Rural Advisory and Training Centre

RDP – Rural Development Programme

Project data

Project title: LIFE CRAFT: Climate Responsible Agriculture for Latvia

Project number: LIFE16 CCM/LV/000083

Project duration: April 1, 2018 – April 30, 2024

Project partners:

Latvian Fund for Nature / www.ldf.lv

Institute for Environmental Solutions / www.vri.lv

Latvian Rural Advisory and

Training Center / www.llkc.lv

Czech Center for Science and Society / www.ccss.cz

Project budget:

1 987 764 EUR, Incl. LIFE Programme funding: 1 177 696 EUR;

Administration of the Latvian Environmental Protection Fund (administered

by the State Regional Development Agency): 463 770 EUR;

Society Integration Foundation: 63 106 EUR;

Municipal Agency “Cesis Culture and Tourism Center”: 3000 EUR;

Project Partners’ Funds: 280 192 EUR.

Tasks of the project

The objective of Climate Responsible Agriculture for Latvia (LIFE CRAFT) was to implement, test, evaluate, promote and provide guidance on effective and economically feasible means for the reduction of agricultural GHG emissions. The project demonstrated opportunities for practical management practices of agricultural lands for GHG emission reduction as a basis for sustainability of rural areas and stimulus for local economies.

The project had three specific objectives:

1. implement, test and demonstrate 3 different GHG emission reducing agricultural management practices at farm level:
    a. No-till farming,
    b. Biochar incorporation into the soil,
    c. Controlled drainage.
2. increase farmer and political decision-maker awareness about available GHG emission reducing agricultural practices by developing a guidebook that lists all the relevant climate responsible agricultural practices applicable in the Baltic Sea region;
3. adapt remote sensing monitoring instruments for improved evaluation of national policy efficiency targeting agricultural GHG emission reduction.

NO-TILL FARMING

As part of the LIFE CRAFT project, AB Latvian Rural Advisory and Training Center in cooperation with eight farms in Latvia tested no-till farming. When working with this method, the only tillage operation is the cutting of the seed tube into the soil. In this way, the soil remains virtually untouched, and plant remains stay on it, which in turn protects the soil from the harmful effects of the weather, limits the development of annual weeds, and also serves as a food base for various organisms living in the soil. As a result, the microbiological activity of the soil, its structure, water and air circulation, fertility, the content of organic matter increases, as well as the resistance of plants to diseases. When working with the no-till farming method, the amount of CO2 released from the soil decreases and the soil, through the plants and microorganisms growing in it, successfully attracts carbon from the air in the long term, thus constantly increasing the content of organic matter in the soil.

Project results show that:

- 2,689 kg less C is emitted from each hectare per year than in the case of traditional technology;
- seeding is 157 EUR/ha cheaper than sowing conventionally;
- the amount of harvest does not significantly differ from that obtained from conventional technology;
- soil compaction does not occur in the long term and the content of the soil's organic matter improves;
- the soil is revived, and its microbiological activity improves.

As a side effect, reduction of the usage of synthetic N fertilizers has been observed. The calculations showed a 50 kg/ ha annual reduction for usage of N.

This action produced the most replication results. No-Till and Strip-Till methods have grown in Latvia from almost 0% of the arable land at the beginning of the project to approx. 15% at the end of the project. This is partly the result of promotional activities carried out by LIFE Craft project. Communication and information materials produced during the project (videos, guidebook, reports, homepage) will serve as a long term investment promoting further replication.

INCORPORATING BIOCHAR INTO THE SOIL

CB Latvian Fund for Nature, together with three organic farms, assessed how CO2 emissions are reduced by applying biochar to the soil and how this approach affects productivity. Biochar incorporation is considered a promising technology for carbon sequestration and reduction of GHG emissions in agriculture, while improving soil structure, texture, porosity, soil particle distribution and soil density.

One of the main preconditions for making the most of the properties of biochar is proper processing before use. Bio-char needs to be incorporated together with or pre-impregnated with plant food substances and/or microorganisms.

The monitoring of the LIFE CRAFT project showed that the application of biochar had a significant impact on such soil properties as the content of organic matter, the content of total carbon in the soil, the pH of the soil, the content of phosphorus pentoxide, zinc and manganese. A significant effect of biochar on soil organic matter and total carbon sequestration was detected, indicating CO_2 sequestration in the soil. However, a positive effect on yield growth was only detected in some cases.

Significant differences in several soil properties were observed between the biochar farms, which can be explained by the differences in the soil composition of the pilot territories, the terrain of the field, the agricultural machinery used, the doses of fertilization and the crops grown. Biochar application had no significant effect on any of the parameters reflecting microbiological activity.

In the context of climate change mitigation and adaptation, biochar has high potential as a soil carbon sequestration tool. However, its application, based only on market principles, is hampered by high costs. The implementation of such an instrument would require additional support mechanisms.

In small farms where biochar production is possible using their own labor and biomass, the use of biochar has a greater potential to become economically feasible, especially if it is used together with other environmentally friendly practices (permaculture, agroforestry, agroecological farming or similar).

CONTROLLED DRAINAGE

AB Institute for Environmental Solutions tested the suitability of controlled drainage in fields as a potential climate change mitigation practice in agriculture in the Smiltene and Meņģele parishes, in two pilot territories.

Controlled drainage differs from a traditional or conventional drainage system by the structure built into the melioration system, which is located at the control points of the drains or at the outlets of the drain collectors. This structure is an adjustable dam and with its help the groundwater level in the reclaimed areas can be controlled.

Controlled drainage helps retain water in the soil; therefore, this method can be recommended to reduce the risk of drought and the leaching of nutrients. This brings benefits to farmers for the application of lower doses of fertilizers and more stable harvests. It brings benefits to the surrounding environment, especially water ecosystems, by reducing the undesirable effects of eutrophication.

GHG monitoring data did not provide unequivocal results about the effect of controlled drainage in reducing GHG emissions, this requires long-term and wider studies. However, the data obtained show a tendency to increase the capture of N_2O emissions in the mineral soils of fields with controlled drainage.

AB Czech Center for Science and Society conducted the monitoring of the controlled drainage. The project implemented the adaptation of remote sensing monitoring tools for the assessment of meteorological data and groundwater level changes.

Crop yields and their vitality data from the LIFE CRAFT project do not show a tendency to gain more productivity in CD fields. Findings varied slightly between pilot areas. This is due to the pre-existing differences between the CD and their reference fields, and due to the short monitoring period (less than two seasons), which was too short to be able to discover the best regulation of the CD according to the specificities of each field, keeping track of the variability in seasonal conditions and considering the specific needs of the selected arable crop. Further monitoring during After-LIFE period will give more justified results of efficiency of this action.

Reports produced during the project

- The guidebook (Action C.1) "Agricultural practices to mitigate climate change" contains articles that compile and assess different measures applied in agricultural sector to reduce CO_2 emissions and practical advice on how to implement the measures on the farm level.
- Recommendations for production of biochar from wood and hay (grass) pellets (Action C.2). The report contains a general description of carbonisation by schematic showing working principles of retorts usually used for wood-based charcoal production in Latvia. Recommendations for biochar production were provided, which are common for both grass and wood biomass.
- Technical report on emission reduction through the use of biochar (Action C.2). The report emphasizes the main results and impact of this method on GHG emission reduction.
- Recommendations for application of biochar in agriculture (Action C.2). The report covers experience gained during testing the efficiency of biochar in farms in order to evaluate its practical application in the conditions prevalent in Latvia.
- Technical report on the use of no-till system in Latvia (Action C.3).
- Technical Report on installation of drainage systems (Action C.4). The LIFE CRAFT project experience in Latvia and research of controlled drainage (CD) elsewhere in the world confirms that CD is recommended in agriculture for reducing drought risk and ensuring a more balanced water regime to adapt and mitigate the adverse effects of climate change on the agricultural sector.
- Methodology for GHG emission evaluation using remote sensing data (Action C.5). AB IES developed an automated land cover classification approach based on Sentinel-2 satellite data within the European Space Agency (ESA) Plan for European Cooperating States (PECS) project 'Simulation of Sentinel- 2 Images for Land Cover/ Land Use Monitoring Using Hyperspectral Airborne Remote Sensing' (SentiSimuLat).
- Report about GHG emission evaluation in the pilot territory based on remote sensing data (Action C.5). The applicability of obtained data products for GHG emission evaluation was

discussed and recommendations for implementation in national GHG emission assessment were provided.

- Monitoring report (Action D.1). The report summarizes the main monitoring conclusions of the LIFE CRAFT project according to each of the mitigation practices tested in the project: biochar incorporation, no-till farming and controlled drainage.

AFTER-LIFE

Goals of the After-LIFE plan

In order to ensure the continuity of project activities and the sustainability of achievements, the After-LIFE plan has the following objectives:

- to ensure long-term sustainable management of demo sites established in the project;
- to promote and spread further the knowledge of three agricultural methods tested during the project;
- to continue raising awareness of the importance of climate friendly agricultural practices;
- to continue monitoring activities in project demo sites in order to gain more justified knowledge on three methods in the long run and calculate CO_2 reduction within a five-year period after the project ending.

The monitoring will be continued to a smaller extent at least five years after the end of the project. Continued GHG monitoring in CDS pilot sites is most important, in order to gain statistically compelling evidence of the application of this method for GHG emission reduction from agricultural fields. At least three years of data are necessary for scientific validity for such GHG emission measures after the CDS installation and application. The project provided for only one full monitoring season after the CDS was fully operational. AB IES has agreed to continue the GHG monitoring and AB CCSS – the monitoring of groundwater levels and local weather conditions in the action C.4 pilot sites five years after the end of the project.

For Bio-char amendment sites (action C.2) and for No-till farming sites (action C.3) the project monitoring data were sufficient to draw conclusions about their impact on climate mitigation. However, monitoring will continue to a minimal extent for five years post-project in order to collect data on CO_2 emission reduction. Monitoring will be continued according to the project final monitoring plan in action C.2 pilot sites by CB LFN and in action C.3 pilot sites by AB LRATC. In addition, AB LRATC will continue monitoring soil bulk density in the same no-till farming sites where it was done during the project.

After-LIFE tasks per action

1. ACTION	2. RESULT OF ACTION	3. AFTER-LIFE OBJECTIVE	4.ENTITY RESPONSIBLE	5.FREQUENCY	6.FUNDS NEEDED/ source	7.PRIORITY LEVEL
A.1	Technical documentation and acquisition of permits for installation of (CDS) elaborated. Brochure "Adaptation of the amelioration system to controlled drainage" released.	Promote brochure "Adaptation of the amelioration system to controlled drainage" released.	AB IES	As required	No funds needed	Low
B.1	Lease of land for installation of CDS	The demo sites will continue operating at least 5 years after the project	AB IES	N/A	No funds needed	High
C.1	Guidebook published	Keep guidebook to be available on the web	CB LFN	Continuously	No funds needed	Medium
C.2	3 demo sites with biochar incorporation established	Continue maintenance of demo sites	CB LFN	Communication with the farmers once a year	No funds needed	High

C.3	Demo sites with no-till established in 8 farms	Continue maintenance of demo sites	AB LRATC	Communication with the farmers once a year	No funds needed	High
C.4	Demo sites with CDS established in 2 sites	Continue maintenance of demo sites	AB IES	Communication with the farmers once a year	No funds needed	High
C.5	Methodology for GHG emission evaluation using remote sensing data prepared.	Promote usage of the methodology developed	AB IES	As required	No funds needed	High
C.6	Replicability and Transferability plan elaborated	Incorporate recommendations of the plan in strategic planning documents of project partners	All project partners	Once a year or in accordance to planning frequency	No funds needed	Low
D.1	Monitoring plan elaborated, monitoring results obtained	Continue most important monitoring activities	All project partners	Twice a year	EUR 30,681 in total; project partners own funding	High
D.2	Project performance indicator monitoring report prepared	No further activities foreseen	N/A	N/A	N/A	N/A
E.1	Notice boards displayed;	Maintain notice boards;	All project partners	Continuously and as required	No funds needed or project partners	High

	3 videos produced; website launched; art exhibition held; Layman's Report produced; articles in mass media published	promote videos; maintain website; promote project main actions; promote reports produced in other actions			own funding if needed	
E.2	Seminars and conferences held	Ensure seminar and conference material availability on project website	CB LFN	Continuously	No funds needed	Low
E.3	Study visits and experience exchange events organized	No further activities foreseen	N/A	N/A	N/A	N/A
F.1	Project management arranged	No further activities foreseen	N/A	N/A	N/A	N/A
F.2	N/A	N/A	N/A	N/A	N/A	N/A
F.3	After-LIFE plan prepared	Implement After-LIFE activities	All project partners	Continuously	Project partners own funding	High
					Total expenditures	**EUR 30,681**

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