RELEASE ON THEMATIC REVIEW

WP 2 2. Communication activities

Activity 2.4 Dissemination activities, seminars and special events organisation

GECO2 – Green Economy and CO2

Safety and resilience | SO 2.1

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Contributors:	Antonio Cinti		

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SUMMARY

On June 30th 2021 started the XXIII Congress of AIAM (Associazione Italiana di Agrometeorologia).

On the above cited date the congress Proceedings were published.

Arpae participated and contributed to the Proceedings by means of the publication "*THE GECO2 PROJECT: A SUSTAINABLE MODEL FOR THE CARBON BUDGET".*

PUBLICATION AVAILABILITY

The publication is available at http://amsacta.unibo.it/6713/1/Atti_AIAM_2021.pdf

In the next sections we report the published abstract and a resume of the main contents.

THE AUTHORS

This work was developed in collaboration with the University of Bologna.

Arpae during the first half of year 2021, in the framework of the GECO2 project, tutored the UNIBO student Francesco Giarri who proactively worked within the project and edited the first draft of this publication.

The complete list of authors is the following: Francesco Giarri (UNIBO), Antonio Volta (ARPAE), Giulia Villani (ARPAE), Leonardo Marotta (ENTROPIA), Fausto Tomei (ARPAE), Antonio Cinti (ARPAE),Ulisse Carlino (UNIBO), Francesca Ventura (UNIBO).

ABSTRACT

Mitigation of climate change aims at optimizing the activities by reducing greenhouse gas emissions, at boosting technological and behavioral alternatives and more sustainable energy sources. No less important is carbon sequestration, especially in the agricultural sector. Since carbon is stored in soil, concentration in the atmosphere results lower as well as the warming effect. The European IT-HR GECO2 project aims to create a voluntary carbon credit market with gains from both economic and environmental point of view. Sustainable farms can sell credits generated by carbon storage, whilst companies, mainly from the agri-food sector, wishing to offset their emissions, will purchase the credits. To manage this trade, a software has been developed. This computes CO_2eq emissions and sequestration due to field management, in order to achieve a budget and to create credits to put on the market. The present work describes the calculator and some preliminary results.

THE PUBLICATION CONTENTS

In the publication the authors explained how the calculator was built. A short description of its main features and directions of using were provided. The calculator replies the scheme of already known calculators. Unless its ancestors the CAFE calculator was tailored on the project needs. It was completely written in C language in order . The calculator as well as its code are published online. The code is available free under the GPL license.

For this publication we computed the mean values of CO2 emissions and sequestration due to the farming management reported at hectare scale. These values were reported in tables in order to simplify the reader interested in getting the effectiveness of each practice.

Here below we report the tables published on the proceedings:

Tab.1 – Carbon sequestered based on the adopted practice.
Tab.1 – Carbonio sequestrato in funzione della pratica conservativa adottata.

Conservative practice	Budget ($kgCO_2eq/ha$)
Conventional tillage	0
Minimum tillage	- 700
No tillage	- 1350
Cover crops	- 1200
Grassed orchard	- 1900
Sparse vegetation	- 2450
Forestry area	- 3000

Tab.2 – Carbon budget as function of the residue treatment adopted.. Values refer to 1 kg of biomass.
Tab.2 – Valori del bilancio di carbonio in funzione del trattamento residuo adottato per il campo. I valori in tabella fanno riferimento al trattamento di 1 kg di biomassa impiegata.

Treaded residue	Budget ($kgCO_2eq$)
Compost forced aeration	0.022
Compost non forced aeration	0.032
Biomass left untreated in heaps or pits	1.79
Wood chips (let in field)	- 0.65
Burned	0.48
Biochar	0.26

Tab.3 – Carbon budget as function of the organic amendment adopted.. Values refer to 1 kg of product.
Tab.3 – Valori del bilancio di carbonio in funzione degli ammendanti usati adottati per il campo. I valori in tabella fanno riferimento ad 1 kg di prodotto impiegato.

Soil improvers	Sequestration ($kgCO_2eq$)	Emissions ($kgCO_2eq$)
Compost	- 0.12	0.02
Manure	- 0.05	0.01
Digestate	- 0.05	0.01
Biochar	- 2.76	0.85
Straw	- 0.63	0.02

Tab.4 – Carbon budget as function of the chemical compound adopted.. Values refer to 1 kg of product.
Tab.4 – Valori del bilancio di carbonio in funzione del composto chimico adottato per il campo. I valori in tabella fanno riferimento ad 1 kg di prodotto impiegato.

Fertilizers	**Budget ($kgCO_2eq$)**
Urea	2.052
Ammonium Nitrate	3.10
Test Compound NPK (15N 15K2O 15P2O5)	1.30
Super Phosphate	0.57
Limestone (55-CaCO3-29CaO)	0.0055
Pesticide (weight of the active principle)	13

Tab.5 – Carbon budget as function of the energy used in the field. Values refer to 1 unit of energy (kWh per electricity, l for fuels).
Tab.5 – Valori del bilancio di carbonio in funzione dell'energia utilizzata dall'azienda per il campo. I valori si riferiscono ad una unità di energia (kWh per l'elettricità e un litro per combustibili)

Energy	**Budget ($kgCO_2eq$) for unit**
Electricity Grid renewables (kWh)	0.030
Electricity No Grid renewables (kWh)	0.54
Diesel (l)	2.68
LPG (l)	1.81
Methane (l)	2.30