Quantification and certification of organic carbon in Mediterranean agricultural soils

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GOBIERNO DE ESPAÑA

MINISTERIO DE AGRICULTURA, PESCA Y ALIMENTACIÓN

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Introduction

Soils are the largest carbon (C) terrestrial sink at global level and at the same time is one of the most vulnerable resources to climate change

CARBOCERT raise from the necesity to adopt new and more sustainable agronomic practices that will allow a better sequestration of organic carbon in agricultural soils.

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Partners

Asociación Agraria Jóvenes Agricultores

UNE Normalización Española

AENOR

IFAPA Instituto de Investigación y Formación Agraria y Pesquera

IRTA Investigación y Tecnología Agroalimentarias

AEAC.SV Asociación Española Agricultura de Conservación Suelos Vivos

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Operating Group objectives

- **1. Provide advice on agronomic and farming practices in order to maximize carbon retention of crops.**

- **2. Determine a suitable certification scheme with methods to quantify the amount of carbon retention.**

The project gives farmers the opportunity to apply methods focused on carbon capture and storage in their crops..

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Studied Crops

WHEAT

RICE

GRAPEVINE

OLIVE

CITRUS

ALMOND

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Operating Group objectives

- **MAIN ACTIVITIES**:
  - Developement of several data bases
    - Agricultural management strategies
    - Quantification methodologies
    - Costs/oppotunities/complexity study
  - Creation of pilot farms network
  - Drafting guides of good agricultural practices for all farmers.
  - Preparation of a Certification methodology
  - Presentation, Sensitization, exploitation and Transfer of Results

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Soil organic carbon sequestration

Study of agricultural practices that promote the increase of organic carbon in the soil.

The soil is the largest carbon reservoir of terrestrial ecosystems (x3 atmosphere & x4 the aerial biomass)

Exemples:

DIRECT SEEDING: technique in which the soil is not turned over, crops are rotated, and what is left from each harvest is used as mulch that releases organic compounds into the soil

GREEN MANURE: created by leaving uprooted or sown crop parts to wither on a field so that they serve as a mulch and soil amendment

Potential capture of 53 Millions tons of CO_2

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Perennial structures of Woody crops

Secondary objective of the project.

Summary of most suitable quantification methodologies per crop

Cultivo	Ecuación alometrica para la estimación biomasa o carbono [a]		Observaciones	Referencia
	Biomasa aérea	Biomasa subterránea: alometria o Ratio root:Shoot		
Vid	*$Biomasa_{fresca}$= 425.90 $(D^2)^{0.555}$ *$Biomasa_{fresca}$= 62.84 $(D^2 \times L_{PE})^{0.431}$		• Variedades: Tempranillo, Grenache syn. Garnacha, Cabernet Sauvignon, Graciano and Marselan. • Localización: Navarra, Cataluña e Islas Baleares • Sistema de conducción: Cordon simple o doble • Densidad de plantación: 2200 cepas/ha	*Miranda et al. (2017)*
Cítricos	ANPP=3.1407 D^2- 13.91 D + 19.639 ANPP= 0.2534 $D^{2.7763}$	BNPP=3.1407 D^2- 13.91 D + 19.639 BNPP= 0.2534 $D^{2.7763}$ Ratio Root:Shoot: 0.349-0.183	• Edad: 2-14 años • Variedad: Naranja Navelina • Localización: Valencia, Castellón y Huelva • Densidad de plantación: 417 arboles/ha	[c]*Quiñones et al. (2013)*
Olivo	[d]Biomasa = 0.328 ABT	-	• Olivos muy jóvenes • Variedad: Arbequina • Localización: Córdoba • Densidad de plantación: 408 arboles/ha	*Villalobos et al. (2006)*
	$Biomasa_{tronco}$= 0.0114 d^2 x h $Biomasa_{ramas\ gruesas}$= 0.0108 d^2 x h $Biomasa_{ramas\ medias}$= 1.672 d $Biomasa_{ramas\ finas\ +\ hojas}$= 0.0354 d^2+1.187 h	Biomasa = 0.147 d^2 Ratio Root:Shoot: 0.303	• Olea europaea var. Sylvestris (Acebuche)	*Ruiz-Peinado et al. (2012)*
Almendro	*Biomasa= e $^{((0.014718\ ^2)/2)}$ x e $^{-1.87511}$ x d $^{2.29843}$	$^2)/2$Biomasa= e $^{((0.014718\ )}$ x e $^{-1.87511}$ x d $^{2.29843}$	• Alometrias para "Otras frondosas" • Alometrias utilizadas en CITA (2008) para estimación biomasa almendros.	*Montero et al. (2005)*
	**Biomasa total parcela= 3.0934 AST_{tronco} + 1.1923		• Localización: California • Extracción de biomasa en parcela comercial.	Datos no publicados de la UC Davis (Contacto: Theodore M. Dejong;tmdejong@ucdavis.edu)

No included in certification scheme as there no significant agricultural methodologies.

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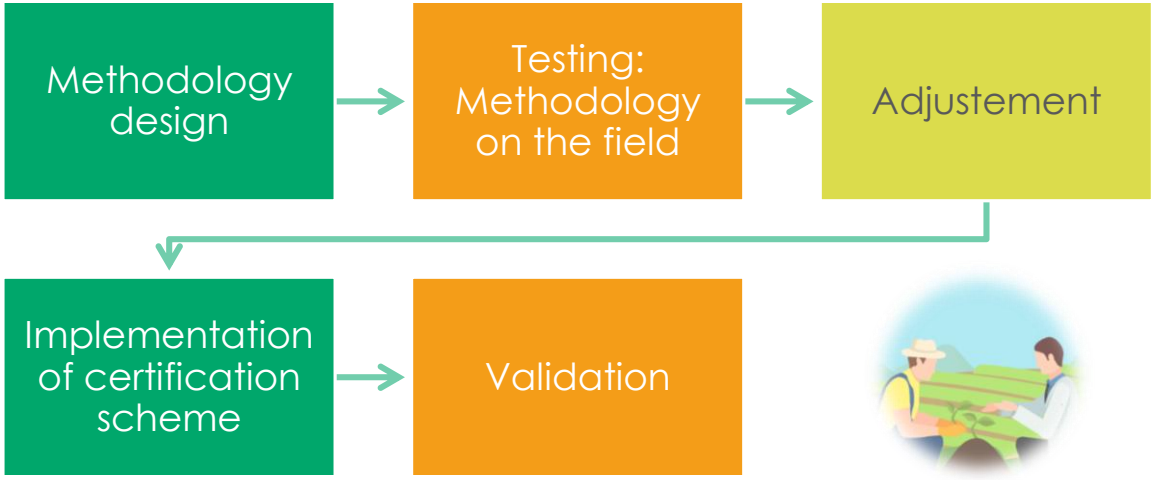
Certification Scheme

OBJECTIVE: create a base certification scheme for future posible developments of certification, label, standards, eco-schemes etc….

Methodology



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Standards

SAMPLES OF REFERENCED EXISTING STANDARDS:

ISO/TC 190 Soil quality

SECRETARIAT: DIN

- **ISO 10694:1995 SOIL QUALITY** — DETERMINATION OF ORGANIC AND TOTAL CARBON AFTER DRY COMBUSTION (ELEMENTARY ANALYSIS)
- **ISO/CD 23400** - GUIDELINES FOR THE DETERMINATION OF ORGANIC CARBON AND NITROGEN STOCKS AND THEIR VARIATIONS IN MINERAL SOIL AT PLOT SCALE

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THANK YOU!

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