

## Using Biochar as a biological filter for water purification: the fertilizer that cleans the environment

### Riferimenti

Tipo di progetto

Gruppo Operativo

Acronimo

RIFASA

Tematica

Risorse idriche

Information

Time frame

2016 - 2019

Durata

36 months

Partners (no.)

9

Regione

Emilia-Romagna

Comparto

Multifiliera

Localizzazione

ITH51 - Piacenza

ITH52 - Parma

Costo totale

€399.965,10

Fonte di finanziamento principale

Programma di sviluppo rurale

Programma di sviluppo rurale

2014IT06RDRP003: Italy - Rural Development

Programme (Regional) - Emilia Romagna

Parole chiave

Landscape /land management

Agricultural production system

Sito web

<http://rifasa.it/>

Project status

completed



### Objectives

During rain events, agricultural pollutants can be transported from fields to surface and/or groundwater resulting in contamination of streams and rivers. Researchers and farmers must work together to find solutions to ensure to preserve crop production without jeopardizing water quality or the health of the ecosystem. Establishment of riparian zones may reduce the effects of diffuse discharges of pollutants into waterways. Addition of biochar to soils in a riparian zone may improve the pollutants removal efficiency of the buffer zone taking advantage of its porous structure. Biomass plant remotion will ensure a reduction of the seeds and parasites allowing adversity control without chemicals.

### Activities

- Financial cooperation
- Studies required to the implementation of the plan (market, feasibility, business plans, etc.)
- Collection (mowing and rotoimballatura) and transport of biomass plant
- Setup load / carbonizer
- Agronomic tests
- Laboratory analysis
- Presentation annual reports
- Drafting of the guidelines
- Data collection
- Plan disclosure of transfer of results and implementation of PEI network
- Training activity

### Context

From 1 January 2012 entered into force the new Italian Ministerial Decree n.

27417 of 22 December 2011, with the introduction of a new standard of conditionality, namely the rule 5.2, which provides "Establishment of buffer strips along water courses." This standard has affected many farmers since it is quite challenging. For buffer zone it is defined as a permanent turf spontaneous band or sown or shrub or tree, spontaneous or implanted, of 5 meters width.

In addition, the Annex III to Reg. Ce 73/2009 provides for the introduction of a crosscompliance requirement for the protection of "streams" from pollution and run-off (run-off), caused by agricultural activities, through creation of a plant protection buffer that skirt such courses as to constitute in case of absence of the buffer zone. The project propose is to the study an innovative farming techniques to increase the effectiveness of the purifying buffer strips, with the use of biochar on buffer strips and with the extension to the neighboring agricultural areas, produced by the carbonization of mown biomass from neighboring embankments. The use of biochar also promote increase of the organic substance and consequently of the microbial biomass with further increase of adsorption and biodegradation of herbicides.

In these areas will be evaluated not only the increase of sewage, but also the increase in organic matter and microbial activity in the soil, turning to make an effective contribution to reducing the loss of nutrients in the waters, in a sustainable way environmentally and economically.

### Partenariato

Role	Azienda	Address	Telephone	E-mail
Leader	Azienda Agraria Sperimentale Stuard S.c.r.l.	Via Madonna dell'Aiuto 7/A 43126 San Pancrazio PR Italy	0521 671569	stuardscrl@arubapec.it
Partner	Agriform s.c.a.r.l.	Via Torelli 17 43123 Parma PR Italy	0521 244785	info@agriform.net
Partner	Università di Bologna - Dipartimento di Chimica "Giacomo Ciamician"	Via Selmi 2 40126 Bologna BO Italy	051 2099545	rita.guerra5@unibo.it
Partner	Azienda Agraria Sperimentale Tadini	Località Gariga 29027 Podenzano PC Italy	0523 523032	tadini@aziendatadini.it

## Uso del Biochar come filtro biologico per la depurazione delle acque: l'ammendante che depura l'ambiente

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Role	Azienda	Address	Telephone	E-mail
Partner	Azienda Agricola Dall'Olio Lorenzo e Claudio	Loc. S. Nazzaro 45 43018 Sissa PR Italy	328 2149881	claudiodall'olio@alice.it
Partner	Azienda Agricola Fanfoni Fratelli	Via Cusani 10 43126 Fraz. Vicomero PR Italy	339 3822161	fanfoniflli@pec.coldiretti.it
Partner	Azienda Agricola Ganazzoli	Via Fontanella 1 43052 Mezzani PR Italy	339 4371653	gianpaola.volta@gmail.com
Partner	Società Agricola Pavarani Società Semplice	Strada Fossa 10 43126 Torrile PR Italy	0521 314162	pavarani73@alice.it
Partner	Università degli Studi di Parma - Dipartimento di Scienze Chimiche, della Vita e della Sostenibilità Ambientale	Parco Area delle Scienze 11/A 43124 Parma PR Italy	0521 905631	dip.scvsa@unipr.it

### Pratiche abstract

#### Description

A1 EXERCISE OF COOPERATION - A monitoring action to ensure compliance with the aspects defined in the Agreement.

#### Description

A2 - STUDIES NEEDED FOR THE MARKET PLAN, EFFECTIVENESS, ETC): The partner Consortium of Bonifica in Parma will provide information on the territory of Parma in order to identify, in the first place, public facilities close to the buffer bundles, able to accommodate the micro cogenerator and later, in collaboration with Stuard and UNIPR, will produce an economic and environmental statement aimed at quantifying the benefits that can be generated by the application of the system.

#### Description

A3 - Sifting, rolling and packing.

The Stuard company will arrange the embankment and buffer strips, using a ribbed ripper capable of loading the product and then transporting it on a sloping belt slider to be used along the buffer bundles, allowing to pack the biomass squeezed out onto a flat surface.

Once packaged the biomass will be transported to the partner ASVT where it will be carbonized.

#### Description

A4 - Micro-carbonizer feed adjustment according to the type of bioamass.

In the premises of the partner ASVT will be placed an innovative prototype of a micro carboniser, granted Free-of-charge, to which will be added a specific feeding system for the biomass that is squeezed out and packaged.

Six months are foreseen for the power system setup, during which it will be biochar product, which will be used for autumnal parcel tests at farms.

The samples of biochar products will be analyzed in the specialized labs, partners of the project.

The biochar production activity will begin on 1/8 2016 and will be carried out throughout the project life.

### Description

A 5 - Agronomic tests.

A cycle of tests will be carried out from autumn 2016, which will compile a different 4 doses of biochar, within a crop rotation that will begin in autumn 2016 with the cultivation of wheat. The biochar obtained from carbonization will be transported to the different farms effective and associated partner of the project and distributed following the experimental drawings on the fields bounded with the buffer bands.

Farms will provide soil preparation, sowing and crop management. Technician from Stuard will assist farmers during ground preparation, sowing, distributing products in the different parcels and managing them for the entire duration of the project. Stuard will carry out agronomic surveys during the cycle and will collaborate on the collection that will be made separately for each parcel, and will also monitor and detect for both the production and the qualitative data for the different theses.

### Description

A6 - Laboratory analysis.

To be performed before sowing, and after harvesting.

UNIPR

Within the framework of the project, the role of UNIPR is to evaluate the efficacy of the biochar which is either functionalized with selected microorganisms as soil modifier to stimulate the growth of active microbial biomass and consequently to improve the filtration efficiency of the buffer bands. In the first phase, in collaboration with the main parameters useful for the chemical-physical characterization of the biochar, in order to evaluate its morphology and chemical composition. This information is important for determining the most advantageous and least beneficial aspects of biochar use in the agricultural and environmental field. First, there is no single type of biochar, but different types depending on the starting material and preparation conditions. Subsequently, UNIPR will evaluate the effects on plant life of different types of biochar, relative to growth parameters and

metabolic function, using different types of plants of agronomic and environmental interest, and different types of soil. At the same time, the microbial community of rhizosphere will be analyzed and how it is influenced by the administration of biochar. Finally, the possible effects on living organisms related to possible toxicity and / or genotoxicity will be evaluated, using also mutagenesis tests and other biochemical and molecular analyzes to determine toxicity and carcinogenicity in vitro. From this stage could emerge the possible risk factors to be considered in each application,

UNIBO

Analysis of biochar characteristics.

### Description

Action A7. Draft annual reports, detailing the technical-managerial details of each business test and the results obtained (year-to-year).

A report will be produced for each company, which will annually record all the results obtained (productions, technical-management data, costs, agronomic data ...) and which will be the basis of any improvements to be introduced for the following year.

### Description

Action A8. Drawing Guidelines for applying and disseminating practices and / or combining tested practices.

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At the end of the planning period, a technical and agronomic account will be produced of the activity carried out in each company, showing the successes and possible failures of the tested techniques in the different types of terrain. The goal is to provide a list of good practices that can make the contextualization of the practices easier, even and above all, depending on the company's characteristics

### Description

#### A9 - Data collection

Data Collection Actions: Sampling and analysis of carbon and biocar content in soils will be carried out at the beginning, mid and end of the three-year trial in accordance with the official soil analysis methods (DM No.79 Of 11/05/1992 and DM No.185 of 13/09/1999), which allow uniformization of analytical methods and obtaining objectively interpretable values. In particular, soil biochemical analysis will follow the guidelines formulated by the International Biochar Initiative (IBI) for standardization of the Biochar for Soil (Standardized Product Definition and Product Testing Guidelines for Biochar That Is Used in Soil - April 2012) and Biochar Quality Mandates and the European Biochar Certificate (UNIPR).

### Description

#### A10 - DIAGNOSTIC TRANSLATION OF RESULTS AND IMPLEMENTATION OF PEI NETWORK

The dissemination of innovation to agricultural enterprises is an activity that the Operational Group intends to take particular care in the context of this Plan, given the importance of this phase in the Community addressing objectives. Therefore, the dissemination activity in addition to the implementation of the PEI network will include a series of dissemination actions capable of contributing to the transfer and application required in the PSR, particularly within Measure 16.1.

Technical Articles

Guided tours

Technical Meeting

Experimental Business Portal

Audiovisual

Connecting to the PEI Network

### Description

A11 - AGRIFORM TRAINING ACTIVITIES as proposed in the Green Catalog.

### Link utili

Titolo/Descrizione	Url	Tipologia
Azienda Stuard	<a href="http://www.stuard.it/">http://www.stuard.it/</a>	Altro
sito web del progetto	<a href="http://rifasa.it/">http://rifasa.it/</a>	Sito web
company website Stuard	<a href="http://www.stuard.it/progetto-rifasa/">http://www.stuard.it/progetto-rifasa/</a>	Link ad altri siti che ospitano informazioni del progetto

## Uso del Biochar come filtro biologico per la depurazione delle acque: l'ammendante che depura l'ambiente

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Titolo/Descrizione	Url	Tipologia
website of the University of Parma	<a href="https://scvsaservizi.campusnet.unipr.it/do/progetti.pl/Show?_id_=kbuu">https://scvsaservizi.campusnet.unipr.it/do/progetti.pl/Show?_id_=kbuu</a>	Link ad altri siti che ospitano informazioni del progetto
Conference in Bologna 1-2 March 2019	<a href="https://www.youtube.com/watch?v=TLwz50YsivI&amp;feature=youtu.%20be">https://www.youtube.com/watch?v=TLwz50YsivI&amp;feature=youtu.%20be</a>	Materiali utili
Conference in Bologna 1-2 March 2019; Interview	<a href="https://www.youtube.com/watch?v=KDOH3xFQdIU&amp;feature=yout%20u.be">https://www.youtube.com/watch?v=KDOH3xFQdIU&amp;feature=yout%20u.be</a>	Materiali utili
Facebook page	<a href="https://www.facebook.com/pg/rifasa.acchiappacarbonio/posts/">https://www.facebook.com/pg/rifasa.acchiappacarbonio/posts/</a>	Materiali utili
Final conference on April 24th	<a href="https://www.youtube.com/watch?v=aMryC6ktEDo&amp;feature=youtu.%20be">https://www.youtube.com/watch?v=aMryC6ktEDo&amp;feature=youtu.%20be</a>	Materiali utili
Official video of the project	<a href="https://www.youtube.com/watch?v=lvGSewgbYBY">https://www.youtube.com/watch?v=lvGSewgbYBY</a>	Materiali utili
Press release	<a href="https://scvsa.unipr.it/it/notizie/rifasa-e-acchiappacarbonioeconomia-sostenibi...">https://scvsa.unipr.it/it/notizie/rifasa-e-acchiappacarbonioeconomia-sostenibi...</a>	Materiali utili
Prototype inauguration at the University of Parma	<a href="https://www.youtube.com/watch?v=amI2i0KhF7Y&amp;feature=youtu.%20be">https://www.youtube.com/watch?v=amI2i0KhF7Y&amp;feature=youtu.%20be</a>	Materiali utili