Organic-mineral fertilizers by using recovered sulphur & orange wastes as sustainable soil recovery from desertification

Reference: LIFE20 ENV/IT/000229 | Acronym: LIFE RecOrgFert PLUS

PROJECT DESCRIPTION

BACKGROUND

Estimates indicate that 38% of land cultivated worldwide has been damaged by conventional agricultural practices, involving soil compaction, loss of organic matter and erosion. Every minute, the world loses 3 ha of arable land due to salinisation and alkalisation and approximately 25 million ha of irrigated land has decreased in productivity due to inappropriate soil management.

In parallel, according to the European Environment Agency (EEA), 8% of the European territory – about 14 million ha – already shows some degrees of desertification, a situation that is particularly serious in southern EU areas.

Citrus is cultivated in southern Europe, and the quantities produced have increased steadily over the last decades. This growth has involved also the processing industry, with some serious negative environmental impacts, considering that only around half of the fresh orange weight is eventually transformed into juice, generating great amounts of residue, which is in large part sent to landfill.

The third problem is due to the large amounts of elemental sulphur recovered from gas and oil desulphurisation, which – although in part reused in industrial applications – in large part remains unutilised and goes to landfill, so representing a potential environmental threat.

OBJECTIVES

The overall objective of the LIFE RecOrgFert PLUS project was to turn orange (citrus) waste and recovered sulphur into a high-quality innovative organic mineral fertiliser, to be used in alkaline and degraded lands to improve soil fertility and productivity.

RESULTS

The project partly achieved its main objectives, as follows:

- design and set up an innovative pilot process for the processing of pellets of sulphur-bentonite with orange waste for the production of an innovative fertiliser, processing on average 3 tonnes/hour, corresponding to a production of 18 000 tonnes/year,
- demonstration of the effectiveness of the new fertiliser (which has been classified, according to EU regulations, as 'inorganic soil improver', suitable for use in organic agriculture) in terms of germination and plant growth for a complete 2-year seasonal vegetation cycle of different crops (pepper, tomato, onion, broccoli and durum wheat) with extended open field tests on 26 ha in southern and central Italy (Calabria and Puglia) and Central Macedonia (Greece). In particular, the following effects on soil properties and crop quality and quantity were highlighted by the scientific study:
  - pH: Decreased from 8.0 to 7.6, with a notable reduction in alkalinity
  - Soil Organic Carbon (SOC): Increased, reaching maximum observed levels
  - Cation Exchange Capacity (CEC): Improved significantly, contributing to enhanced
  - nutrient-holding capacity
  - Soil moisture: reached maximum level, indicating improved water retention
  - Yield: Approximately doubled compared to control, demonstrating a substantial increase in productivity,

- verification, through a 'Life Cycle Approach', of the low environmental impact of the new organic-mineralfertiliser and its usability in organic agriculture,
- demonstrate the economic viability of the process through the development of a Business Plan, aimed at enhancing the direct commercialisation of the fertiliser and at the replication and transfer of the pilot plant to other regions and crops.

However, the new 'inorganic soil improver' was not marketed during the implementation of the project because the production plant had to stop its operations prematurely. Therefore, no replication activities took place.

At the end of the project, the pilot plant had a maximum potential production capacity of 4 800 and 10% dried orange waste). This outcome drastically reduced the environmental and economic benefits generated by the

project, which were as follows:

- quantity of recovered sulphur: 48 tonnes,
- waste reduction: 26.4 tonnes of wet orange waste not sent to landfill,
- quantity of produced organic-mineral fertiliser: 60 tonnes (all used for the agronomic tests as no sale of fertiliser took place),
- reduced greenhouse gas (GHG) emissions: 15 tonnes/year.

The project contributed to the implementation of the following EU policies: Waste Framework Directive (2008/98/EC); EU Circular Economy Action Plan (COM/2020/98 final); EU Thematic Strategy for Soil Protection. Furthermore, the new fertiliser complies with the EU Fertilising Products Regulation (EC) 2019/1009, proving that it is possible to recycle waste materials and turn them into an effective fertiliser.

ADMINISTRATIVE DATA

Reference: LIFE20 ENV/IT/000229
Acronym: LIFE RecOrgFert PLUS
Start Date: 01/09/2021
End Date: 28/02/2025
Total Eligible Budget: 3,170,643 €
EU Contribution: 1,743,850 €

CONTACT DETAILS

Coordinating Beneficiary: SBS Steel Belt Systems SRL
Legal Status: PCO
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Contact Person: Antonio Scialletti

SEND EMAIL

VISIT WEBSITE

READ MORE RESOURCES

Type	Resource
Project web site	Project's website
Publication	Layperson's report
Publication	After-LIFE plan
Video link	Video produced by CONFINDUSTRIA
Video link	Video with project's results
Video link	Video of project Opening Conference
Project web site - 2	Social media: LinkedIn

ENVIRONMENTAL ISSUES ADDRESSED

THEMES

Description	Parent Description
Agriculture - Forestry	Industry-Production
Agricultural waste	Waste
Waste recycling	Waste
Circular economy and Value chains	Environmental management
Bio-waste (including food waste)	Waste
Resource efficiency	Environmental management

KEYWORDS

Description
soil
agricultural waste
fertiliser
organic matter

TARGET EU LEGISLATION

Description	Parent Description
COM(2015)614 - "Closing the loop - An EU action plan for the Circular Economy"(02.12.2015)	Waste
COM(2021)699 - EU Soil Strategy for 2030: Reaping the benefits of healthy soils for people, food, nature and climate (17.11.2021)	Land & Soil
COM/2020/98 - A new Circular Economy Action Plan For a cleaner and more competitive Europe (11.03.2020)	Waste

PARTNERSHIPS

Name	Status	Type
AFARM(AMERICAN FARM SCHOOL POSTSECONDARY EDUCATIONAL AND TRAINING ASSOCIATION), Greece	ACTIVE	Participant
ZOLFITAL (ZOLFITAL S.p.A.), Italy	ACTIVE	Participant
UNIRC(Università Mediterranea di Reggio Calabria), Italy	ACTIVE	Participant
BRANCA(F.lli Branca S.p.A.), Italy	ACTIVE	Participant
SBS Steel Belt Systems SRL	ACTIVE	Coordinator