LIFE
MICROFIGHTER

LIFE Microfighter

Innovative Zeo-Biopesticides, based on beneficial microorganisms, to eliminate the use of copper-based pesticides

PROJECT ID

101074218 — LIFE21-ENV-IT-LIFE MICROFIGHTER

LIFE
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A NATURAL SOLUTION FOR SUSTAINABLE CROP PROTECTION IN EUROPE

The Challenge

Copper-based products are widely used in organic farming to protect crops such as grapevine, tomato and olive. However, their long-term use is no longer sustainable. Copper accumulates in the soil and can negatively affect:

- **soil biodiversity**
- **ecosystem balance**
- **water quality**

At the same time, farmers still rely on copper because effective natural alternatives are limited. In line with the EU Green Deal and the Farm to Fork Strategy, Europe is moving towards reducing chemical inputs and promoting sustainable plant protection.

The key challenge is clear:
reduce copper use without compromising crop protection, yield and quality

The Solution

LIFE MICROFIGHTER
developed and tested an innovative natural Zeo-Ziopesticide called:
MICROFIGHTER

It combines:
- natural K-chabasite zeolite
- a beneficial microorganism: Pseudomonas sp. DLS65

This innovative formulation aims to:
- reduce copper dependency
- maintain crop protection
- support sustainable agriculture

Project overview

Duration:
August 2022 – January 2026

Countries involved:
Italy, Spain, Croatia

Crops tested:
Grapevine, Tomato, Olive

The project combined:
- field trials
- product development
- environmental assessment
- socio-economic analysis
- training and dissemination

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WHAT WE DID

LIFE MICROFIGHTER carried out large-scale field demonstrations over three growing seasons (2023–2025)

Four treatment strategies were tested:

- No treatment
- Standard copper dose
- Reduced copper + Microfighter
- Microfighter alone

A Stable and Scalable Product:

A key achievement was improving the formulation of Microfighter.
Results showed that:

- beneficial microorganisms remain viable for up to **6 months**
- proper humidity control is essential
- the product can be produced, stored and distributed effectively

This is a critical step towards real market uptake.

The project also:

- analysed soil conditions and copper levels
- evaluated crop yield and quality
- tested product stability and shelf-life
- assessed environmental and socio-economic impacts
- trained farmers and stakeholders

KEY RESULTS

Up to 50%

Reduction of copper use
In many cases, copper inputs were halved without significant loss of protection

Best performance with integrated strategy

The most effective approach was:
50% copper + 50% Microfighter
This combination often achieved results comparable to standard treatments

No negative effects on crops

Across trials:

- no phytotoxicity observed
- no significant yield reduction
- no negative impact on crop quality

Compatible with farming practices

Microfighter proved:

- easy to apply
- stable in solution
- adaptable to existing practices

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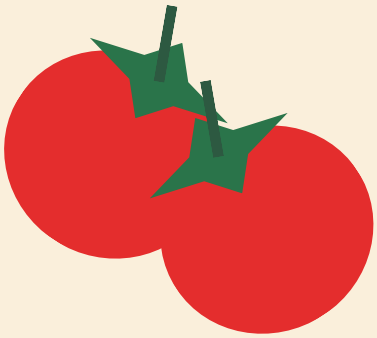
CROP-SPECIFIC INSIGHTS

GRAPEVINE

- Performance depends strongly on disease pressure
- Not sufficient alone in high-pressure organic systems
- Effective in integrated strategies and moderate conditions
- Enables significant copper reduction when properly positioned

TOMATO

- Effective against bacterial diseases
- No negative impact on yield or plant health
- Performance close to standard treatments in many cases



OLIVE

- One of the most promising crops
- Good control of olive diseases
- Comparable results to standard copper strategies in several trials

Product Quality: No Trade-Off

The project assessed the impact on:

Wine | Tomato products | Olive oil

Results showed:

- no significant differences in marketability
- no major differences in quality
- comparable performance between reduced-copper strategy and standard treatments

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IMPACTS

ENVIRONMENTAL
ECONOMIC
SOCIAL

ENVIRONMENTAL

Reducing copper use leads to:

- lower accumulation of metals in soil
- improved soil biodiversity
- reduced pressure on water ecosystems

LIFE MICROFIGHTER contributed to filling this gap through systematic soil monitoring

ECONOMIC

The project demonstrated that:

- reducing copper can be compatible with farm productivity
- crop quality and market value can be maintained

Environmental benefits are clear, although not always easy to quantify economically

SOCIAL

A survey involving **150 farmers** revealed that:

- copper-related issues are widely known
- most farmers still rely on copper
- awareness of alternatives is limited
- interest in innovation is high
- willingness to pay remains low

This highlights a key barrier:

adoption depends not only on technology, but also on awareness, training and economic conditions

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COMMUNICATION & TRAINING

The project actively engaged stakeholders through

7
Workshops

3
Countries

Italy
Spain
Croatia

7
Training courses for technicians, cooperatives, and producers

25
Articles

3
Radio interviews

1
Television presentation

44
Participation fairs and events

8
Networking activities with other European projects

8
Meetings with 10 policy makers

1000 +
Stakeholders were reached across Europe

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LESSONS LEARNED

The project delivered a clear message

There is no one-size-fits-all solution

Effective copper reduction depends on:

- climate conditions
- disease pressure
- application timing
- integration with agronomic practices

The winning approach is integration

Microfighter works best:

- as part of a combined strategy
- supported by disease forecasting tools
- adapted to local conditions

focus on

3
Years of field trials

3
Crops tested

Up to 50%
Copper reduction

44
Dissemination events

150
Farmers surveyed

1
After-LIFE Plan

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CONCLUSIONS

LIFE MICROFIGHTER has shown that:

- natural biopesticides can significantly reduce copper use
- up to 50% reduction is achievable in many contexts
- crop yield and quality can be preserved
- integrated strategies are the most effective pathway

The project provides a concrete contribution to:
sustainable agriculture
soil protection
EU environmental objectives

Project Partners

CO&SO VICINI ALLE PERSONE

ASTRA INNOVAZIONE E SVILUPPO

Sveučilište u Zadru
Universitas Studiorum Jadertina | 1396 | 2002 |

Consiglio Nazionale delle Ricerche

cooperatives agro-alimentàries Comunitat Valenciana

Consorzio Agrario di Ravenna dal 1899

Università degli Studi di Ferrara

UNIMORE UNIVERSITÀ DEGLI STUDI DI MODENA E REGGIO EMILIA

Symbiagro