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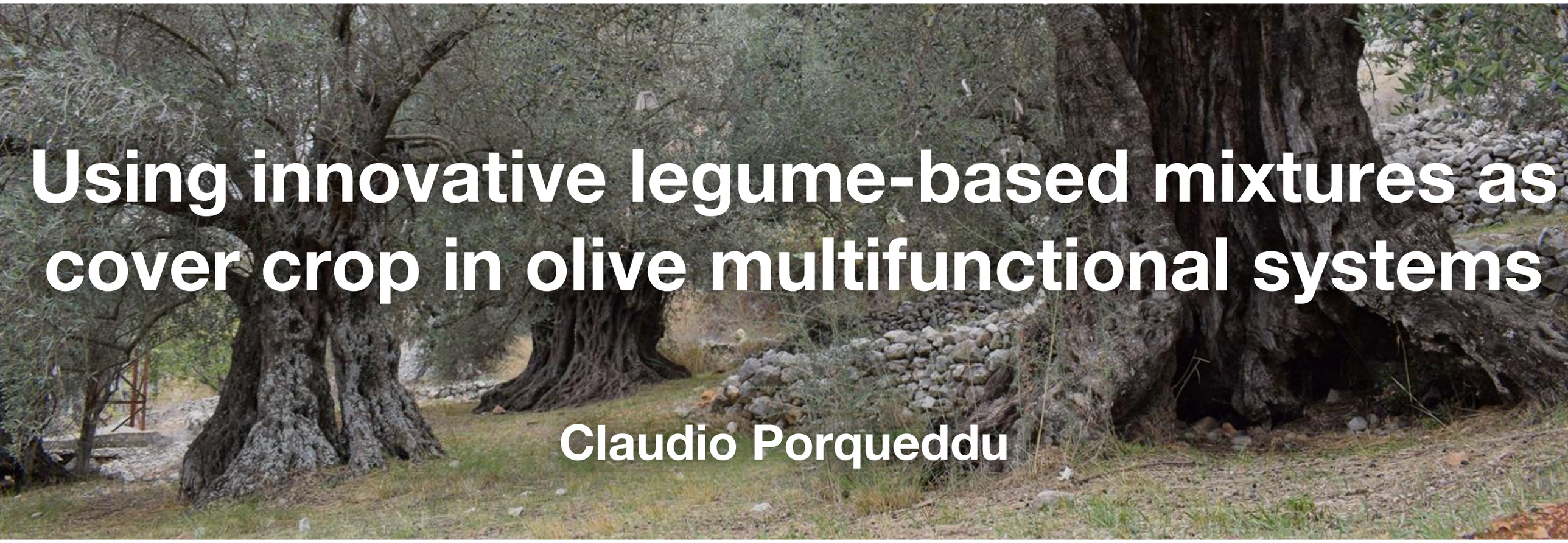

Using innovative legume-based mixtures as cover crop in olive multifunctional systems

Claudio Porqueddu

Second B2B event in Jordan on Multifunctional Olive Systems

Amman - March 14th, 2023

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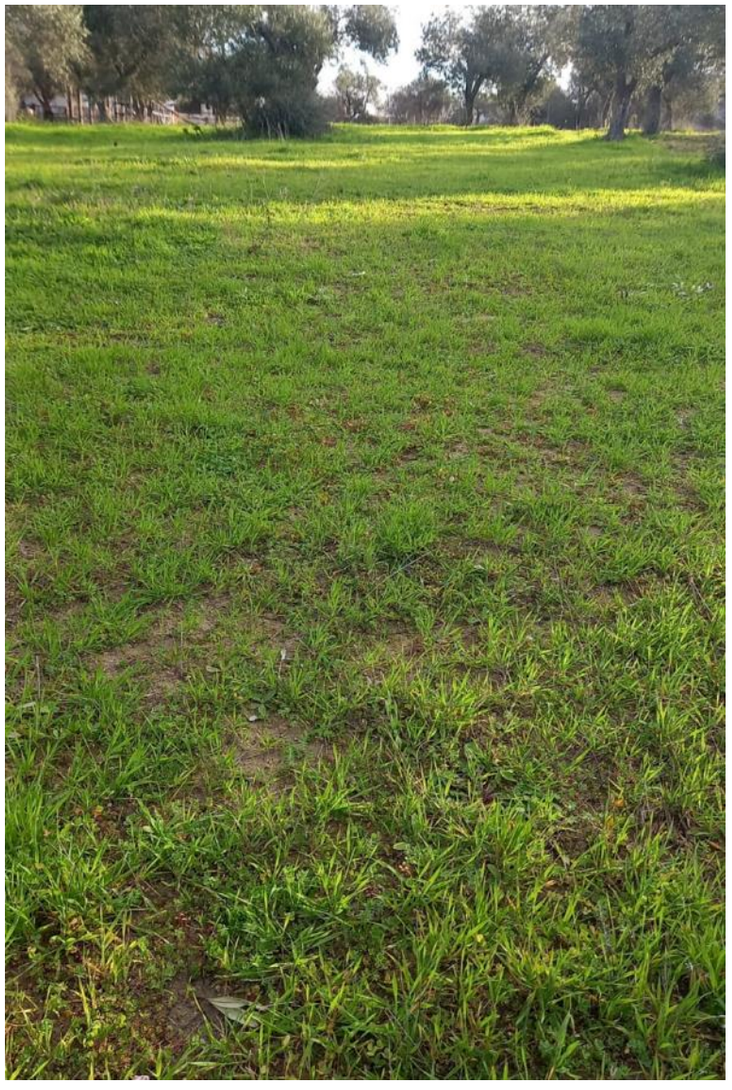
What is a cover crop?



Cover crops are plants used to cover soil in a "new" sustainable soil management technique.

Typically, **legume-based mixtures** are used aiming at **reducing inputs** (fertilisers, fuels, chemical weeding) and at **increasing ecosystem services** of olive groves, i.e. biodiversity, soil C sequestration, etc.

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Use of legume-based mixtures as cover crops: benefits

The implementation of legume-based mixtures as cover crops improves the sustainability of the multifunctional olive grove systems, as long as they are well adapted to the local soil and climatic conditions.

Their benefits are:

- supplying nitrogen through legumes N-fixation
- promoting weed control
- preventing soil erosion
- increasing soil fertility and carbon sequestration
- higher flexibility of farm management (i.e. chopping or grazing)
- improving quality of olive production
- enabling immediate field accessibility, ensuring prompt mechanical intervention in wet soils (especially in clay soils)

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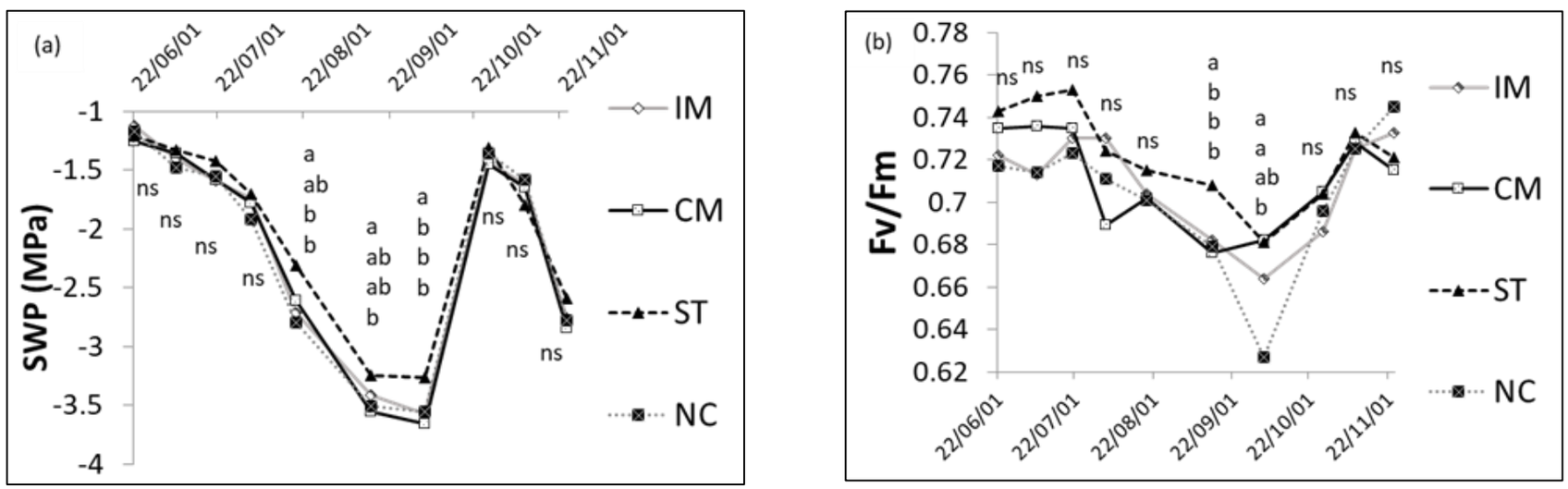
LIVINGAGRO Field trials with cover crops in Sardinia and Lebanon

Comparison among four treatments:

1) Soil covered with innovative mixture (IM)
2) Soil covered with commercial mixture (CM)
3) Natural covering and fertilization (NC)
4) Traditional tillage and fertilization (ST)



(Porqueddu et al., 2023)

Figure 1. Stem Water Potential (SWP, megapascal = MPa) (a) and photosynthetic efficiency (Fv/Fm) (b) under four different soil management treatments. Different letters indicate significantly different means; ns = no significant difference (P<0.05)

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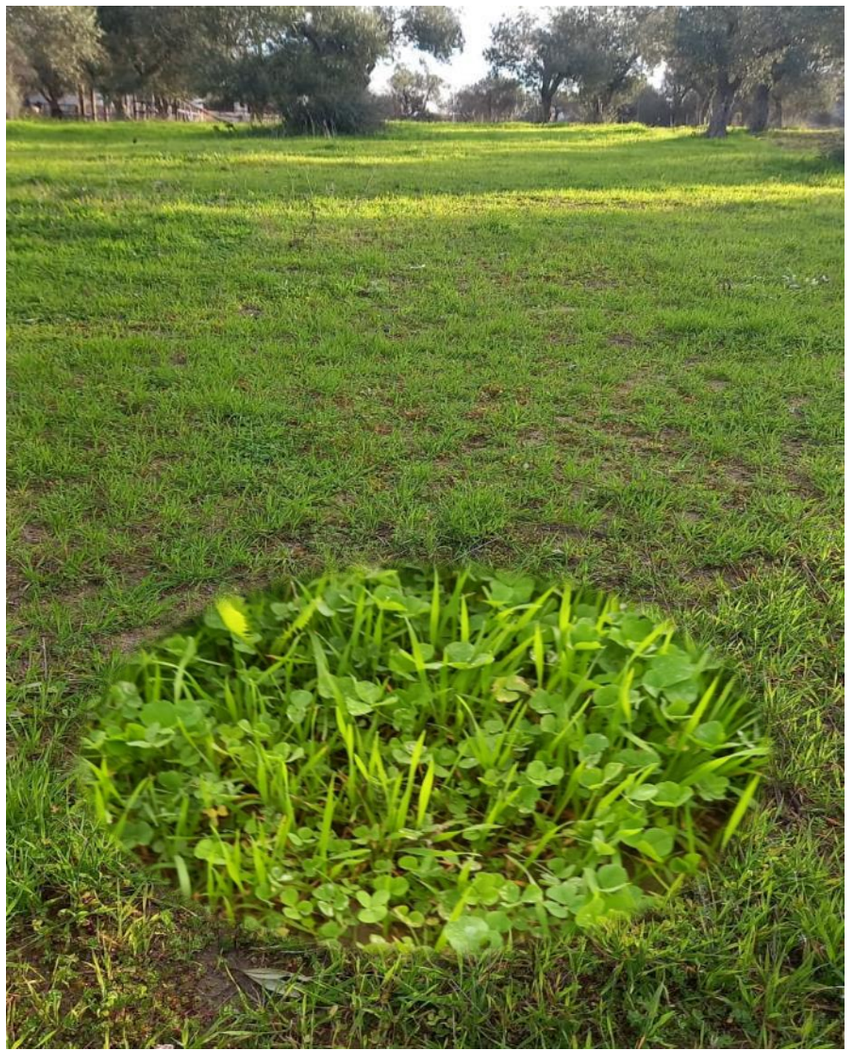
Traits of the innovative legume-based seed mixture (IM)

- Assortment of species and varieties as combination of different functional groups: N-fixing *vs* N-user, prostrate *vs* semi-erect habitus, degree of hardseededness, earliness, shade tolerance and drought avoidance
- combination of well adapted site-specific **annual self-reseeding species**

Mixture component	Cultivar	Functional group				
		N-fix (Y/N)	Habitus	hardseededness	Earliness (n. days)	Shade tolerance
Medicago polymorpha	Anglona	Y	semi-erect	High	130	medium
Trifolium brachycalycinum	Antas	Y	Prostrate	Medium	134	high
Tritolium yanninicum	Trikkala	Y	Prostrate	Medium	112	high
Lolium rigidum	Nurra	N	Erect	low	120	medium



Cover crop re-establisment in Autumn 2022

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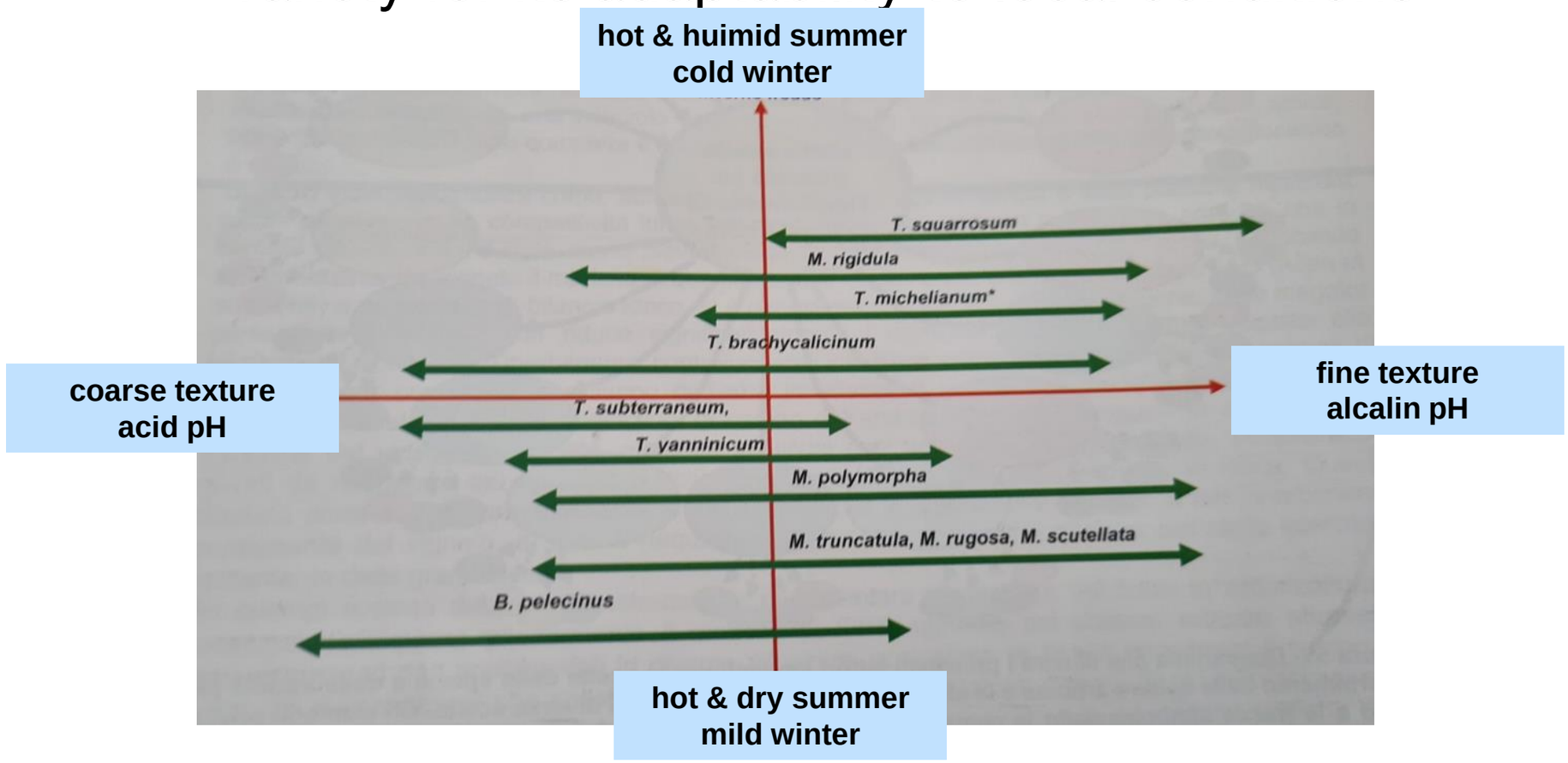
Geographical scale of application of legume-based mixtures

Climate and soil requirements for effective growth

- Average annual rainfall above 500-600 mm
- A wide range of soils can be cultivated with annual self-reseeding legumes, BUT choose the right species and variety for its adaptability to local conditions



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Who can benefit from the use of legume-based mix?

Olive-growers

Sheep farmers

Link with innovation

‘Livestock grazing in olive groves’

↓

Wildfires prevention

Social benefit

- Seed companies

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Estimation of costs to establish a legume-based cover crop in Italy

Cost description	Euro per hectare (€)
Soil tillage + inorganic fertilization + seedbed preparation + sowing with the row seeder + rolling	270
Binary or ternary fertiliser (200 kg/ha)	200
Seed mixture (25 kg)	180
Value Added Tax (VAT=22%)	143
Total cost	**793**

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Potential revenues and/or the potential savings implementing legume-based cover crops

Cost reduction

- Soil tillage
- Herbicides
- N-fertilisers

Easier transition to the organic production regime with higher added value

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Potential social and environmental benefits of cover crops

- Increased farmers income
- Mitigation of climate change
- Lower environmental impact on soil and water
- Rehabilitation of abandoned and/or degraded olive groves
- Improvement of the landscape and recreational usability of the olive grove

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