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

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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)





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: Nfixing 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

	Cultivar	Functional group				
Mixture component		N-fix (Y/N)	Habitus	hardsee dedness	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	Ν	Erect	low	120	medium
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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 selfreseeding 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	180				
	Value Added Tax (VAT=22%)	143				
	Total cost	793				
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zia forestale regionale per lo sviluppo del torio e dell'ambiente della Sardegna

















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



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



















REGIONE AUTÒNOMA DE SARDIGNA REGIONE AUTONOMA DELLA SARDEGNA

Third B2B event on Multifunctional Olive Systems

Beirut - February 16th, 2023















