



Using innovative legume-based mixtures in grazed woodland agroforestry systems

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What is the purpose of the innovation?



Typically, the use of **legume-based mixtures** aims at **reducing inputs** (fertilisers, fuels, chemical weeding) and at **increasing ecosystem services** of grazed woodlands, i.e. biodiversity, soil C sequestration, etc.

Use of legume-based mixtures: benefits

The implementation of legume-based mixtures improves the sustainability of the grazed woodland systems, as long as they are well adapted to the local soil and climatic conditions.

Their benefits are:

- supplying nitrogen through legumes N-fixation
- improving seasonal forage distribution
- improving forage quality
- promoting weed control
- preventing soil erosion
- increasing soil fertility and C-sequestration
- improving animal product quality



Root nodule bacteria



LIVINGAGRO Field trials with legume-based pasture mixtures in Sardinia

Objective: comparing three types of pastures

- 1) Improved pasture with CNR-innovative mixture
- 2) Improved pasture with commercial mixture
- 3) Natural soil covering + fertilization



Mr. Manca farm, Central Sardinia –
Soil bed preparation with minimum tillage
and rolling after sowing in Autumn 2021.



Innovative mix

Natural pasture

Traits of the innovative CNR legume-based seed mixture

- Assortment of species and varieties as combination of different functional groups: N-fixing vs N-user, slow vs fast establishing, prostrate vs semi-erect habitus, degree of hardseededness, earliness, shade tolerance and drought avoidance

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 subterraneum	Campeda	Y	Prostrate	Medium	134	high
Ornithopus sativum	Orniferti	Y	Erect	low	112	medium
Lolium rigidum	Nurra	N	Erect	low	120	medium
Dactylis glomerata	Amba	N	Semi-erect	low	125	high
Cichorium intybus	Spadona	N	Erect	low	130	low



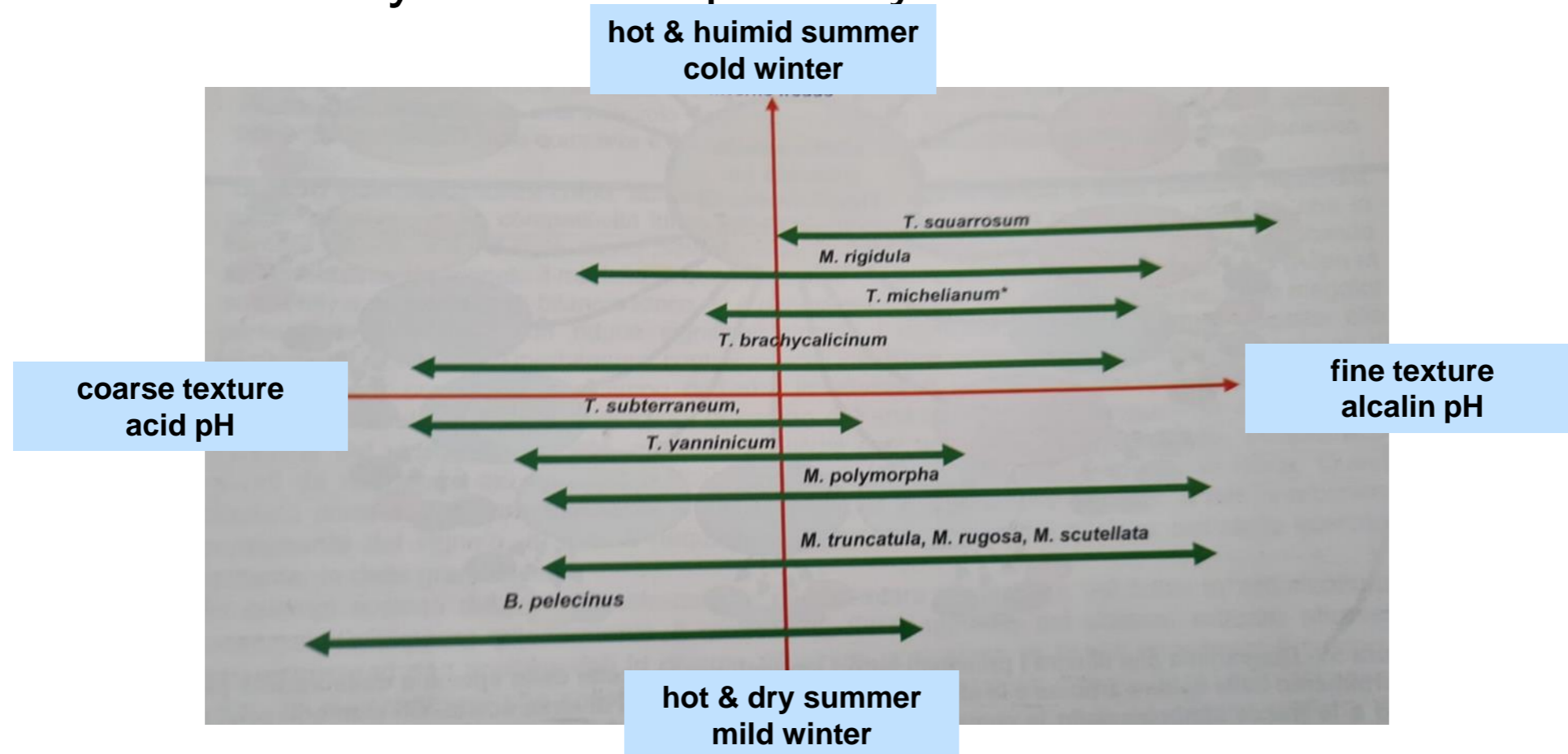
Monti (Sardinia) Spring 2022



Geographical scale of application of legume-based mixtures

Climate and soil requirements for effective growth

- Average annual rainfall above 400-500 mm
- A wide range of soils can be cultivated with annual self-seeding legumes, BUT choose the right species and variety for its adaptability to local conditions





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

- Silvopastoral farms

Wildfires prevention



Social benefits

- Seed companies



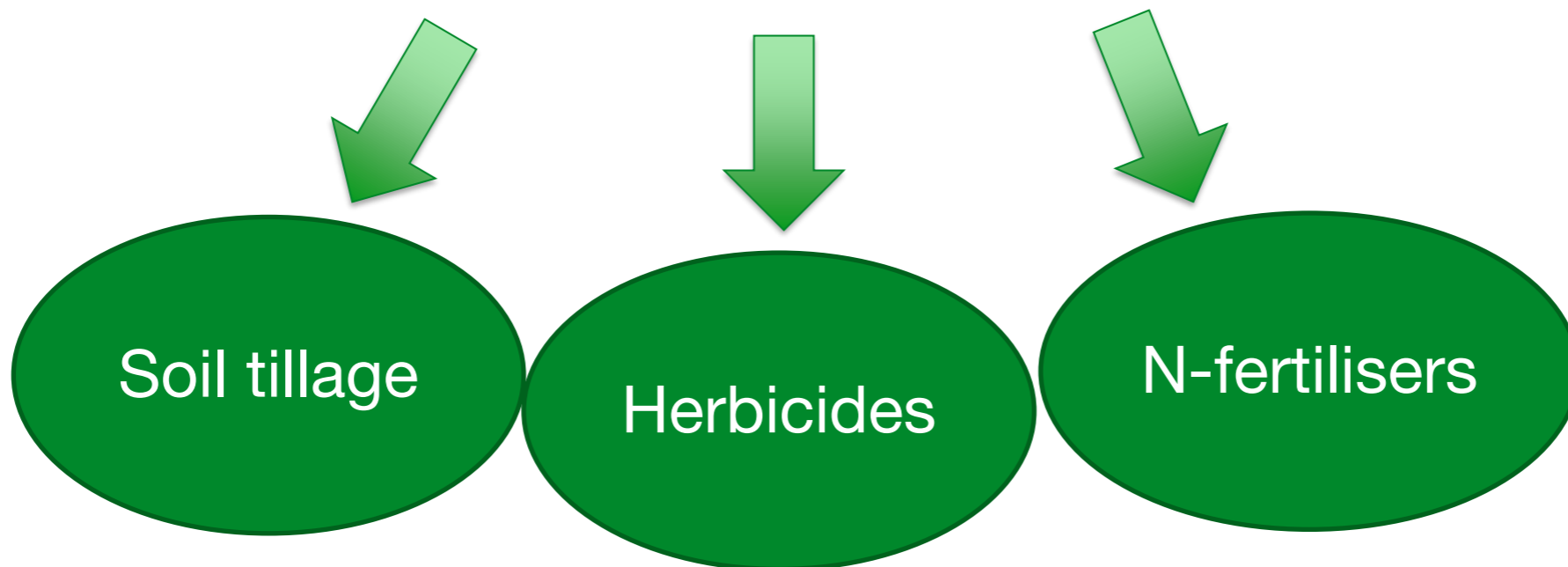
Estimation of costs to establish a legume-based pasture in Italy

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



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

Cost reduction



Easier transition to the organic production regime
with higher added value

Potential social/environmental benefits of legume-based pastures

- Increased farmers' income
- Mitigation of climate change
- Lower env. impact on soil and water
- Rehabilitation of abandoned and/or degraded lands
- Improvement of the landscape and recreational usability of silvopastoral areas



