

SelPiBioLife - Innovative silvicultural treatments to enhance soil biodiversity in artificial black pine stands



SelPiBioLife project

Reference

LIFE13
BIO/IT/000282

Duration

5 years
02-JUN-2014 to
31-MAY -2019

Budget

Total budget
1,549,975.00 €

EU
contribution
768,594.00 €

Location

Tuscany



Study visit to Italy for Bulgarian LIFE Programme officials. Rome, 26 July 2017



SelPiBioLife: partners

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Unione dei
Comuni del
Pratomagno



CREA FL Research Centre for
Forestry and Wood, Council for
Agriculture and Economics



UNIVERSITÀ
DI SIENA
1240



Compagnia delle Foreste



Unione dei Comuni
Amiata Val d'Orcia



CREA AA Research Centre for
Agriculture and Environment, Council
for Agriculture Research and
Economics



LIFE13 BIO/IT/000262
Prodotto e realizzato con il contributo
della Direzione Regionale LIFE
dell'UE

Background: Black pine Stands in Appennine



Black pine stands are, in general, established throughout the Apennines after the Second World War with the purpose of re-establishing forest cover in marginal and eroded soils.

Today the key functions are the protection against soil erosion and the hydrological regulation of catchments.

Background: black pine plantations

In Italy, black pine and calabrian pine forests cover nearly 236.467 hectares (23% of the total area covered by conifers).

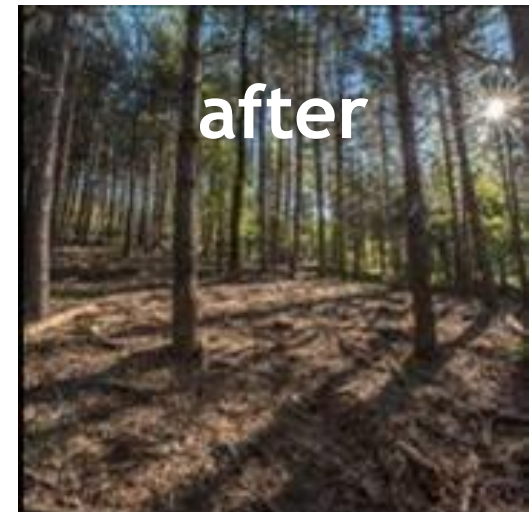
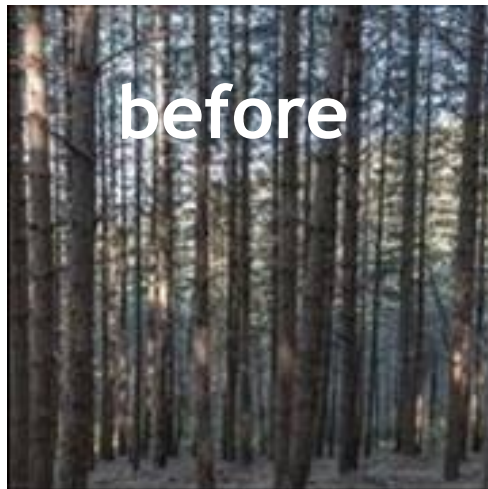
In Tuscany, these forests cover nearly 20.500 hectares.



Today: management of black pine stands

In order to guarantee the multifunctional and sustainable role of these stands, it is necessary to establish and realize a series of silvicultural treatments finalized to:

- increase the overall mechanical stability of the stand;
- regulate the mixing species;
- increase production value of the stand



SelPiBioLife: the idea

Forests play an important role in maintaining fundamental ecological processes, such as water regulation and carbon storage

Forest canopy is the active interface between 90% of terrestrial biomass and atmosphere

Soil plays a fundamental role in forest ecosystems: soil's functionality is closely related to root system's functionality, dynamics of the succession forest and is home to micro and mesofauna, fungi and plants.

Most of Italian black pine plantations need silvicultural interventions to preserve their ecological stability and productivity

There are few researches focused on the effects of forest management on soil biodiversity

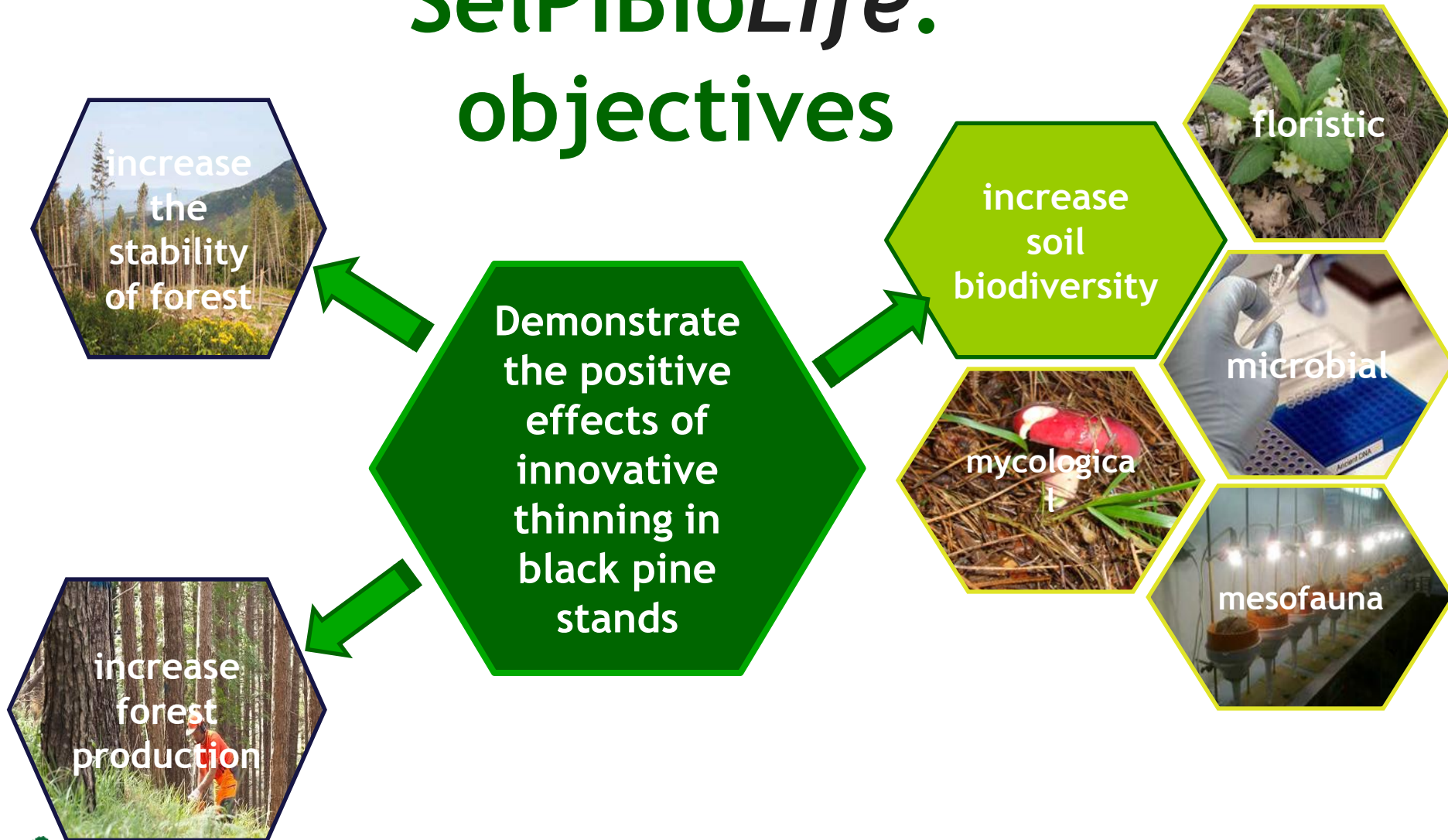
Forest management in Italy is mainly aimed at maintaining productive and protective functions



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SelPiBioLife: objectives

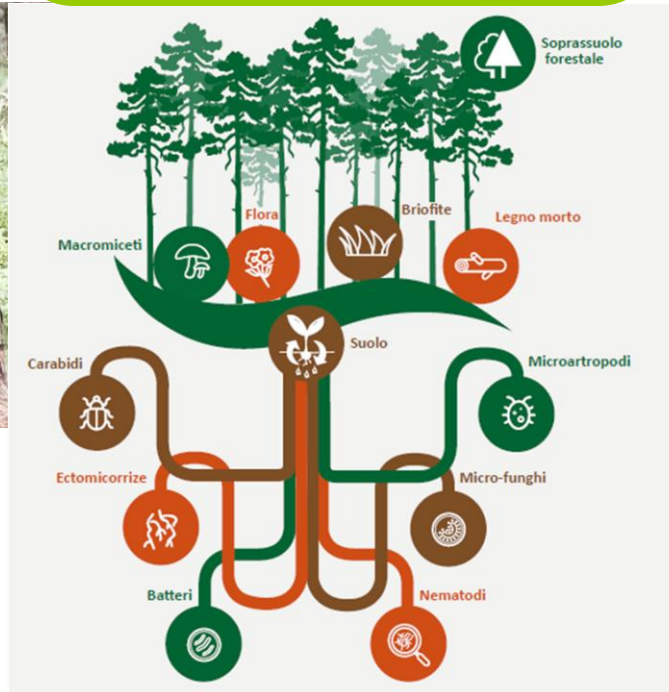


SelPiBioLife: how to apply the idea

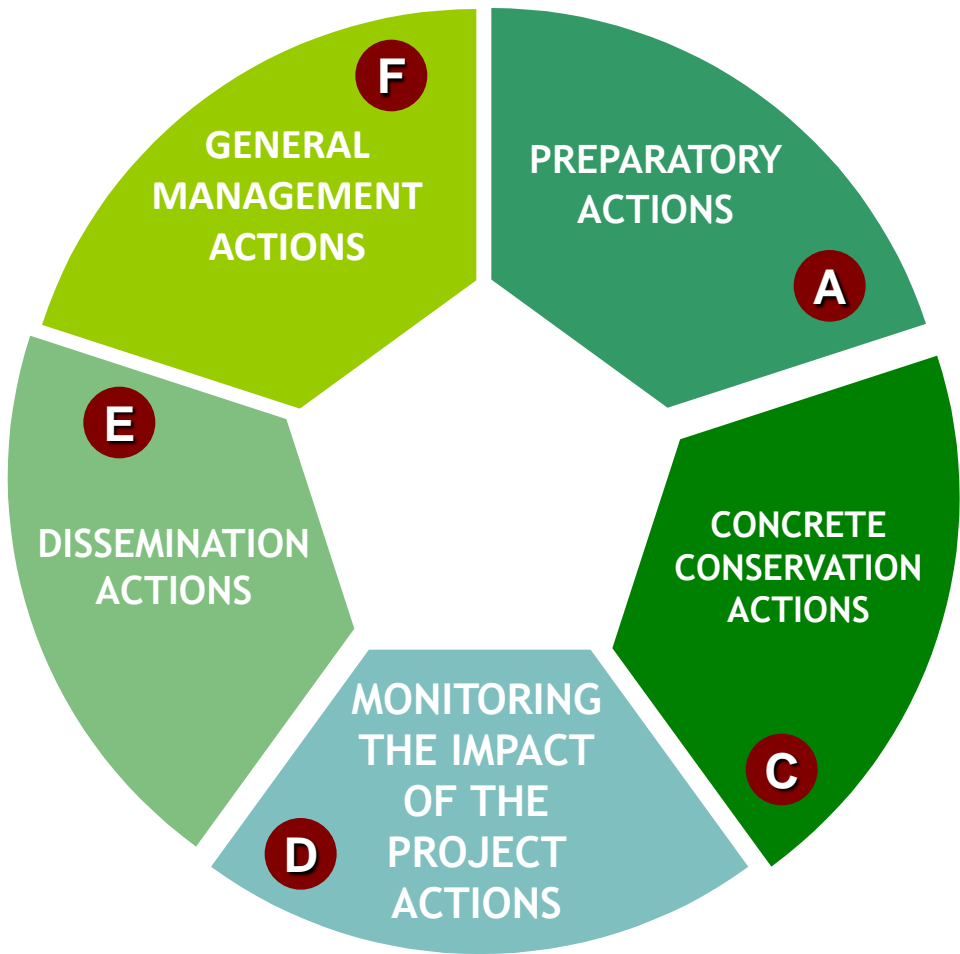
Stands where thinning is necessary.

Realization of thinning

Monitoring forest structure and biodiversity components: before and after

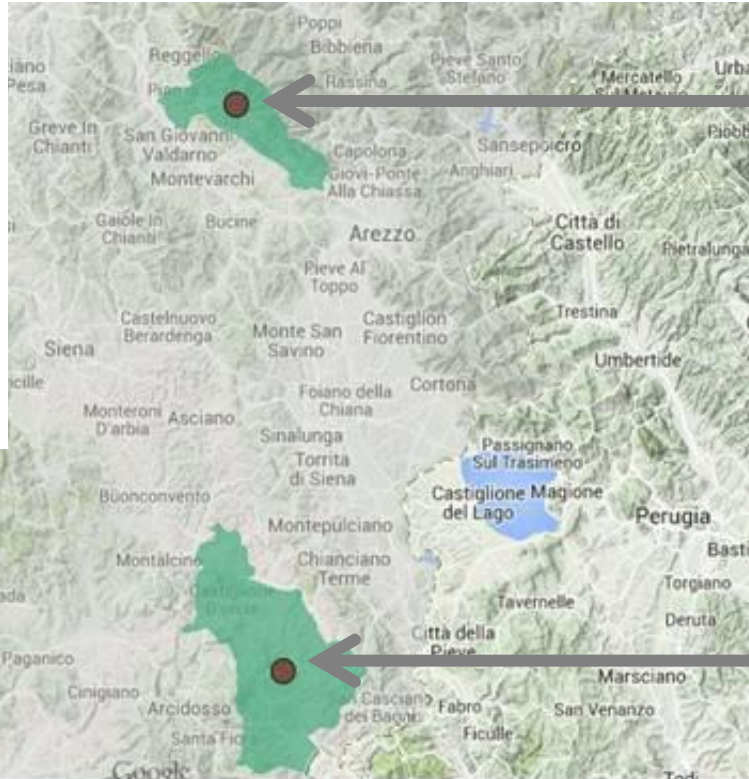


SelPiBioLife: Actions



- A**
 - A1 Framework of the landscapes
 - A2 Assessment of structural and dendrometric parameters of forest stands before silvicultural treatment.
 - A3 -A4-A5 Biodiversity monitoring before treatment
- C**
 - C1 Definition and achievement of the thinning operations in the UC Pratomagno pilot area.
 - C2 Definition and achievement of the thinning operations in the UC Amiata Val D'Orcia.
- D**
 - D1 Assessment of structural and dendrometric parameters of forest stands post treatment.
 - D2-D3-D4 Biodiversity monitoring post treatment
- E**
 - E1 Identification of the stakeholders and of the main target audience subjects
 - E2 Planning, achievement and management of the web-site
 - E3 Realization of the notice board
 - E4 Realization of meetings
 - E5-E6 Dissemination of the results
 - E7 Layman's report realization
- F**
 - F1 General management of the project

Monitoring areas

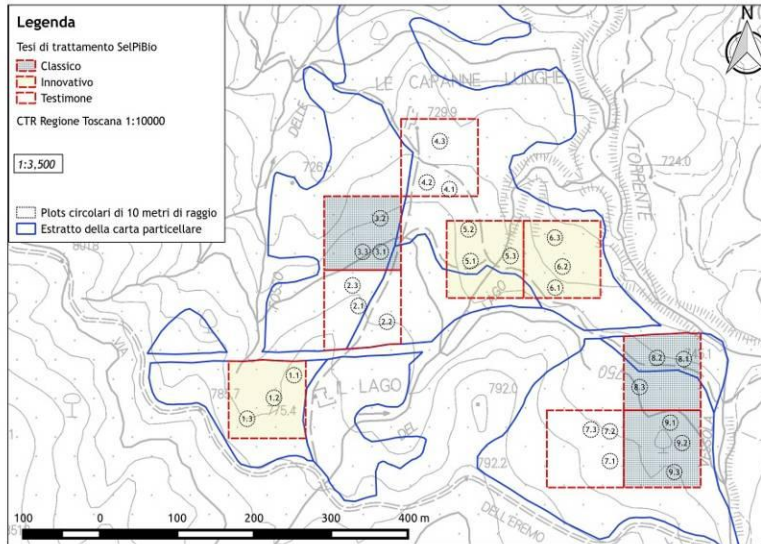


“Pratomagno-
Valdarno”- «Pian della
cucina» Municipality:
Loro Ciuffenna (AR)
PRATOMAGNO

«Madonna delle Querce»
- «Il Lago» Municipality:
Castiglione d’Orcia (SI)
AMIATA

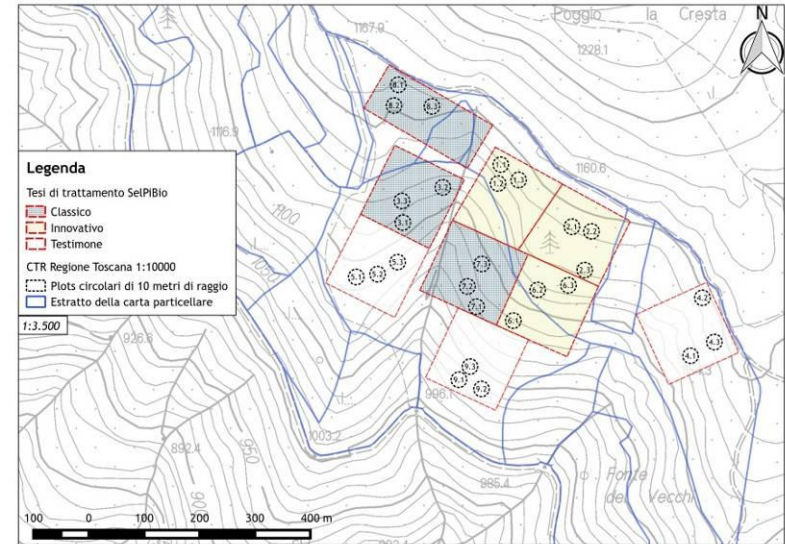
Brief description of the areas

Amiata



- Altitude: about 800 m a.s.l.
- Exposition: North-North-West
- Average slope: 3-6%.
- Vegetation: high
- pH : 6,9
- Total organic carbon (TOC): 1,73%

Pratomagno



- Altitude: about 1100 m a.s.l.
- Exposition: South- West
- Average slope: 20-25%
- Vegetation: low
- pH : 5,5
- Total organic carbon (TOC): 1,76%

Experimental scheme

9 areas (1ha each) for each experimental site, with 3 replicates of each silvicultural thesis

3 *plots* (10 m diameter - 314 mq) for each area were selected for sampling and three thesis applied

- ✓ selective thinning
- ✓ traditional thinning
- ✓ control

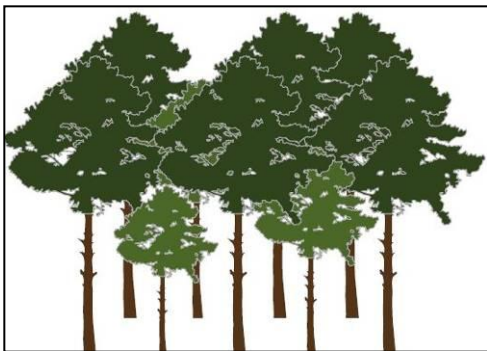
A total of 27 *plots* for each site

SelPiBioLife research hypotheses: 3 silvicultural treatments

control



No intervention is realized



traditional



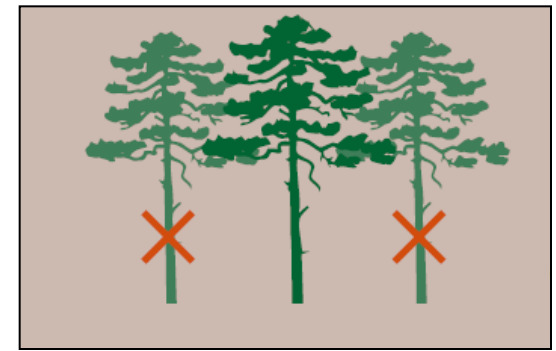
Dominated trees are removed.
No significant effect on canopy cover.



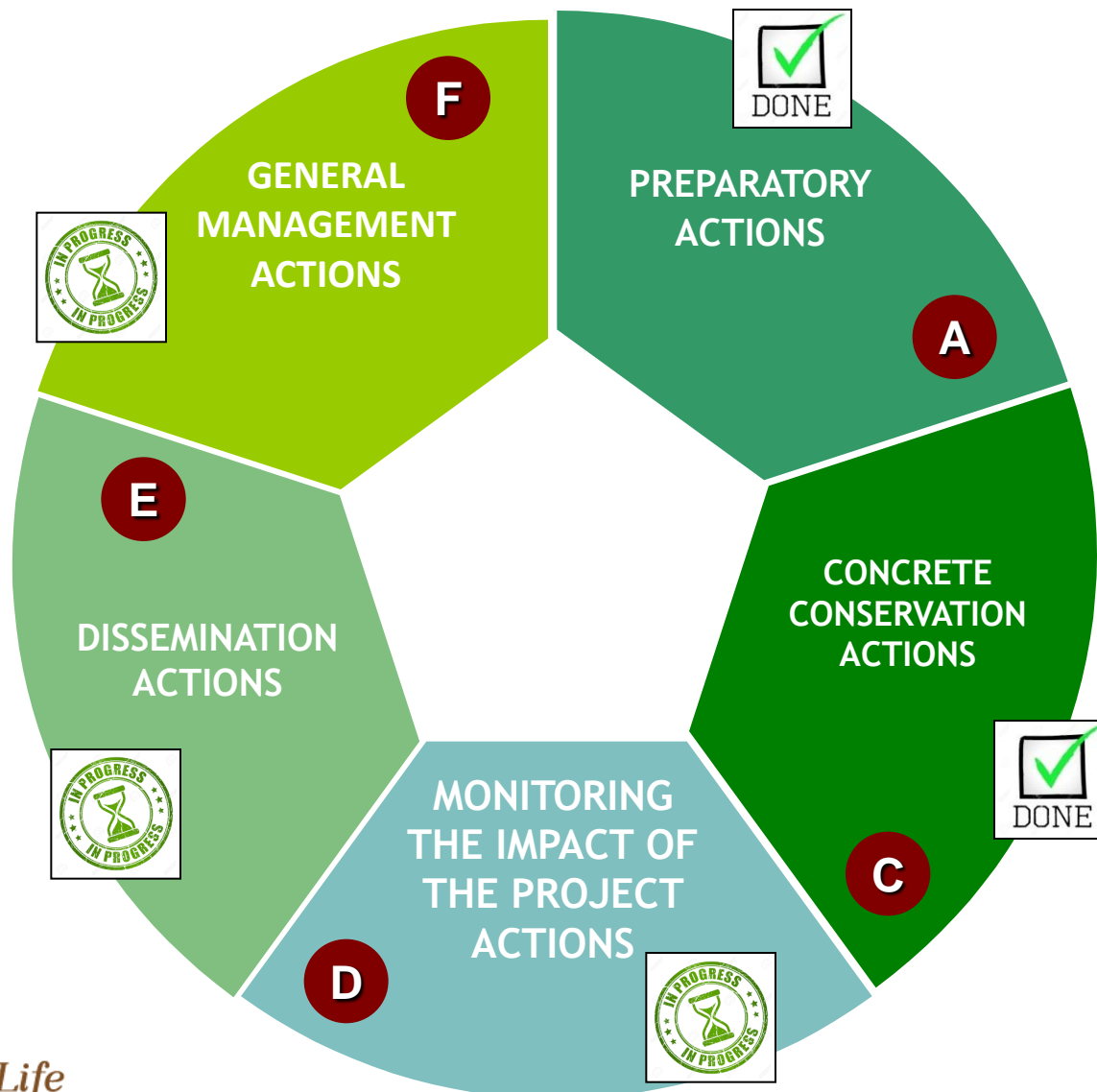
selective



Selection of 100 candidate trees per hectare and removal of direct competitors.



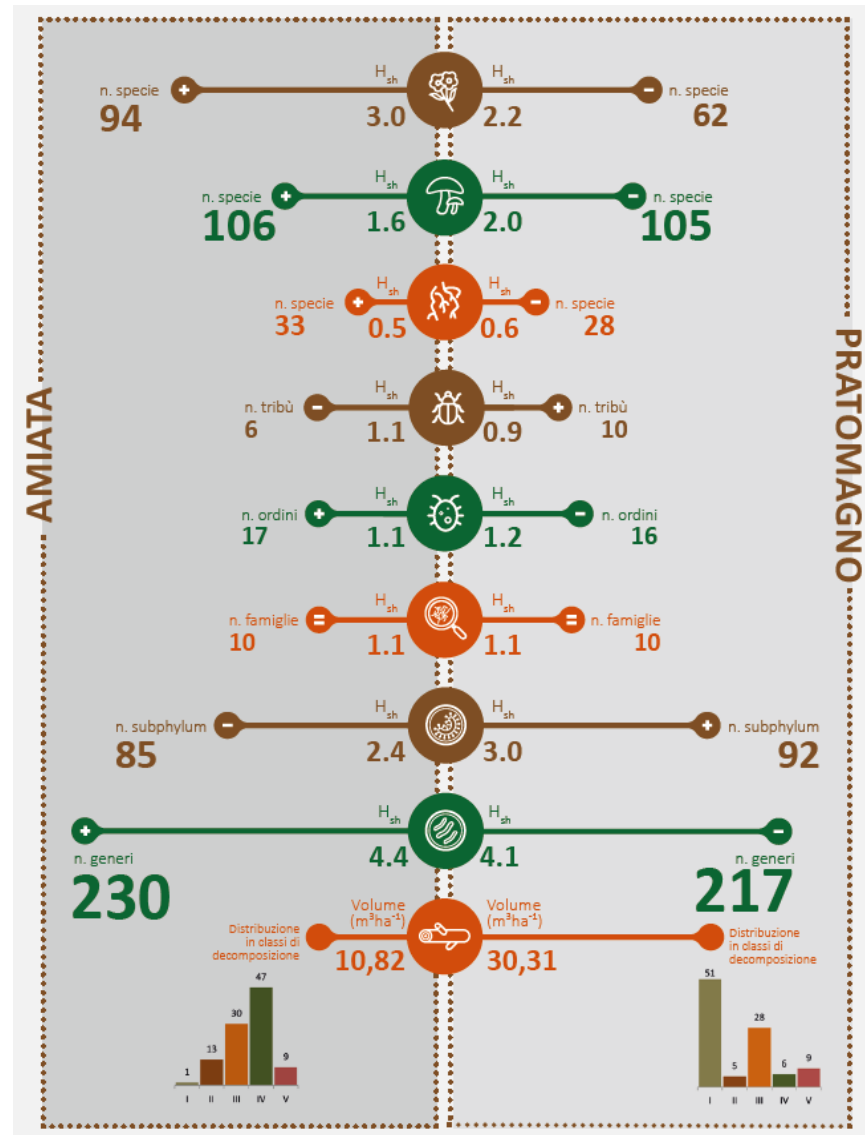
SelPiBioLife: Project's Progress



SelPiBioLife: results (examples)

Biodiversity measurements before thinning

Number of species and Shannon index for component



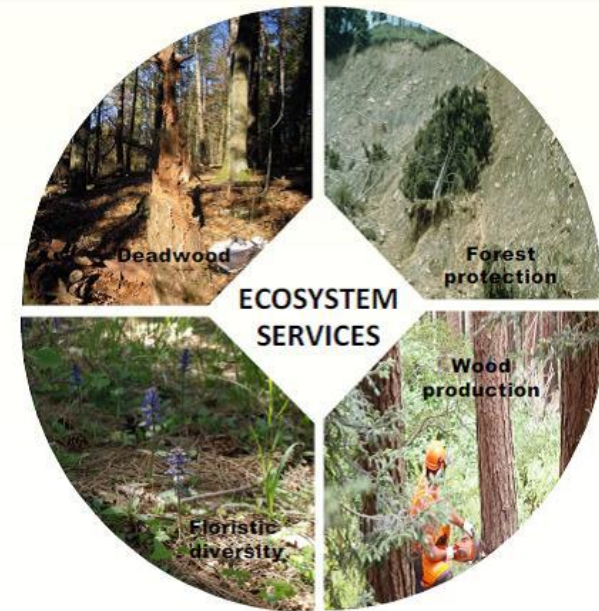
SelPiBioLife: results (examples)

Trade-off analysis

Trade-off between ecosystem services in the two study areas

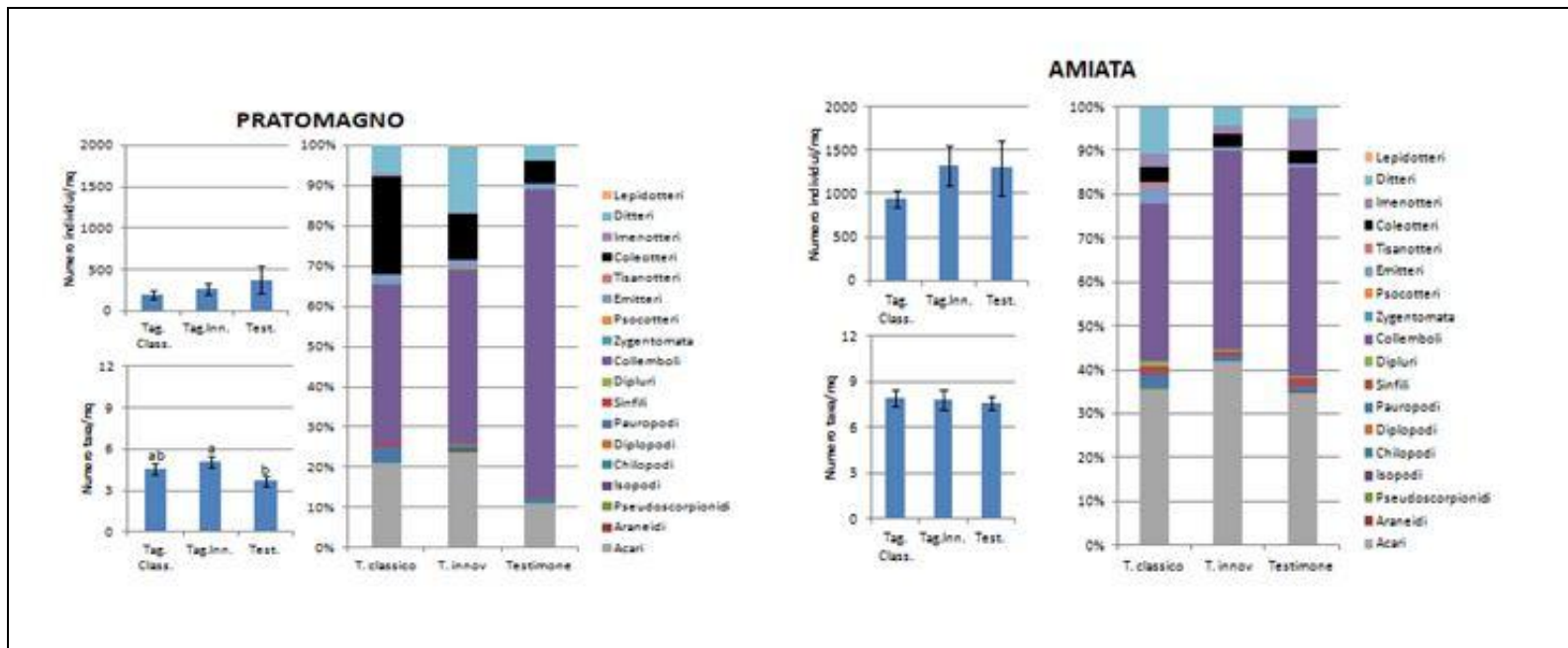
| Silvicultural treatments | Provisioning services (€ yr ⁻¹) | Regulating services | Supporting services | |
|------------------------------|---------------------------------------------|-----------------------------------------------------|-----------------------------------------------------|----------------------------------------------|
| | Timber and woodchips production | Forest stand stability (annual variation H:D ratio) | Standing dead trees Reduction of Snag volume (%) | Floristic biodiversity Shannon index (H') |
| <i>Amiata study area</i> | | | | |
| Traditional thinning | 1067 | -0.969 | -53% | 3,2 |
| Selective thinning | 2163 | -1.284 | -55% | 3,1 |
| <i>Pratomagno study area</i> | | | | |
| Traditional thinning | 4211 | -0.889 | -30% | 2,2 |
| Selective thinning | 5388 | -1.012 | -92% | 2,5 |

In bold the silvicultural treatments more efficient to enhance the single ecosystem service



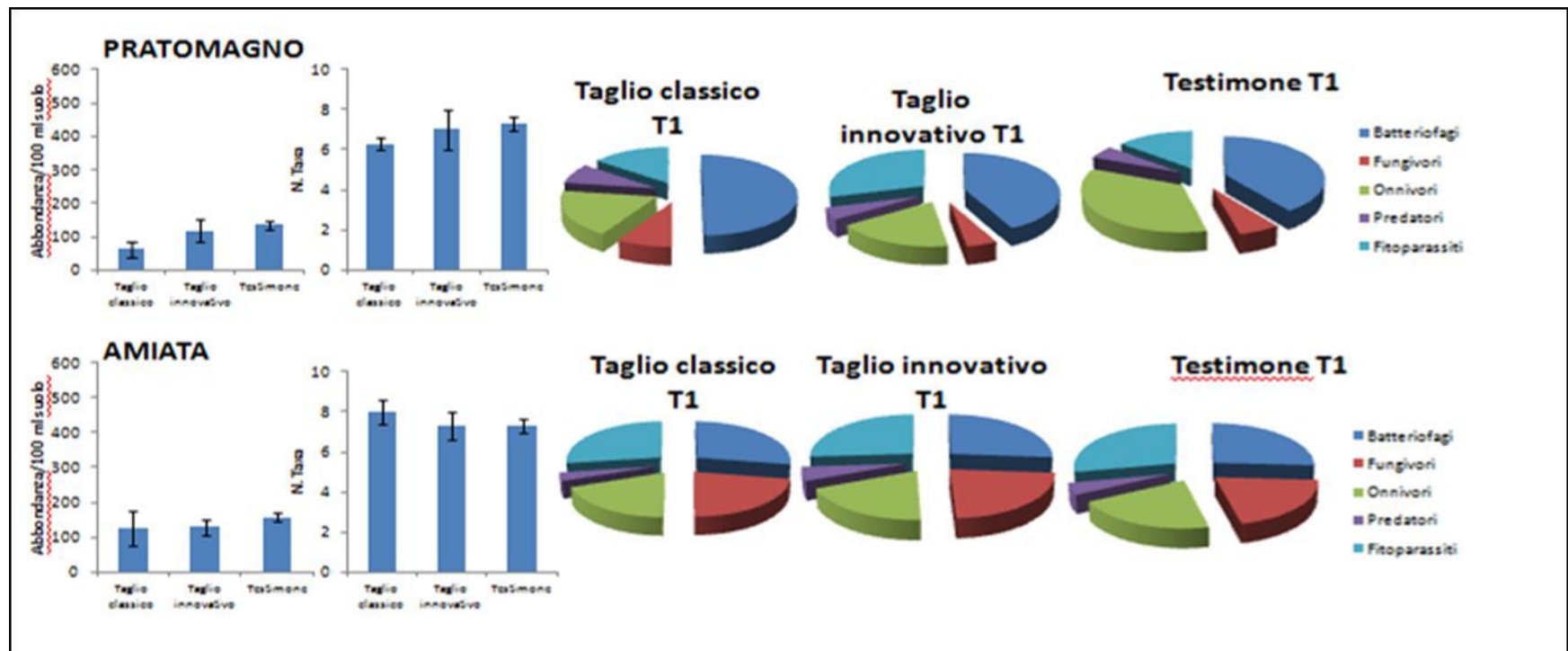
SelPiBioLife: results (examples)

Soil mesofauna biodiversity



SelPiBioLife: results (examples)

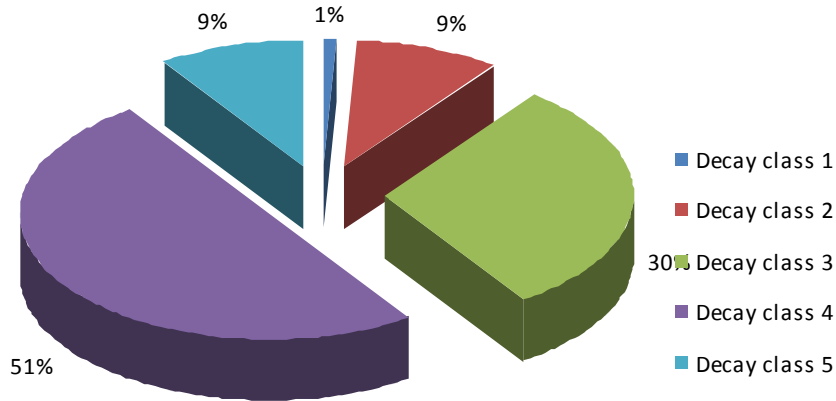
Soil microfauna biodiversity



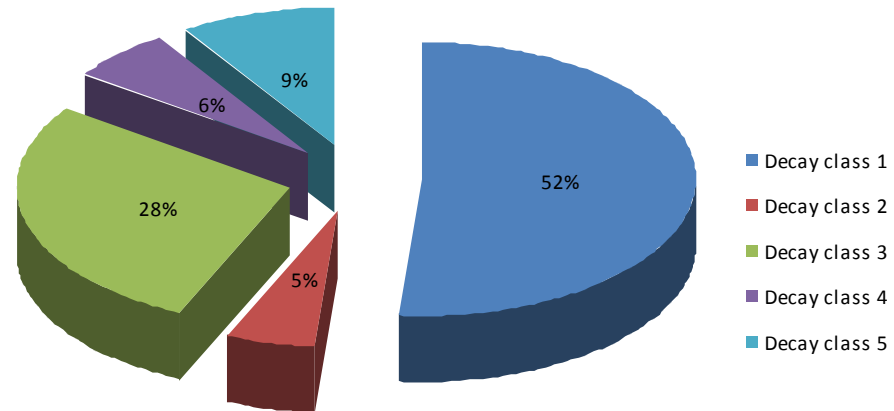
SelPiBioLife: results (examples)

lying deadwood

Area Amiata Val d'Orcia



Area del Pratomagno



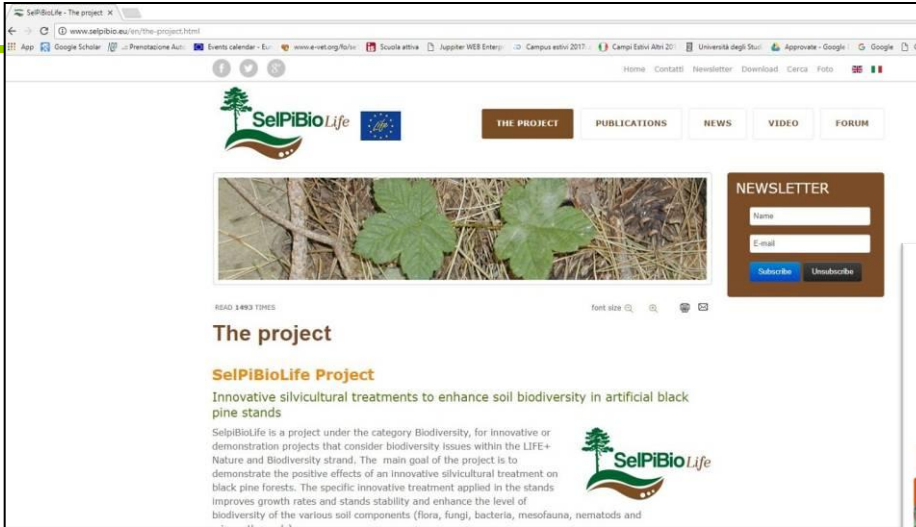
SelPiBioLife: replicability

- ✓ In forest stands with heliophilous species;
- ✓ To improve timber quality (i.e. growth rate of candidate trees) in young even-aged stands or to support the classical silvicultural efforts for species succession (climax) in mature forests“
- ✓ In forest stands characterized by trees with goods characteristics in order to ensure mechanical stability.
- ✓ In stands in which the owners are interested to obtain quality of the assortments better than those usually produced

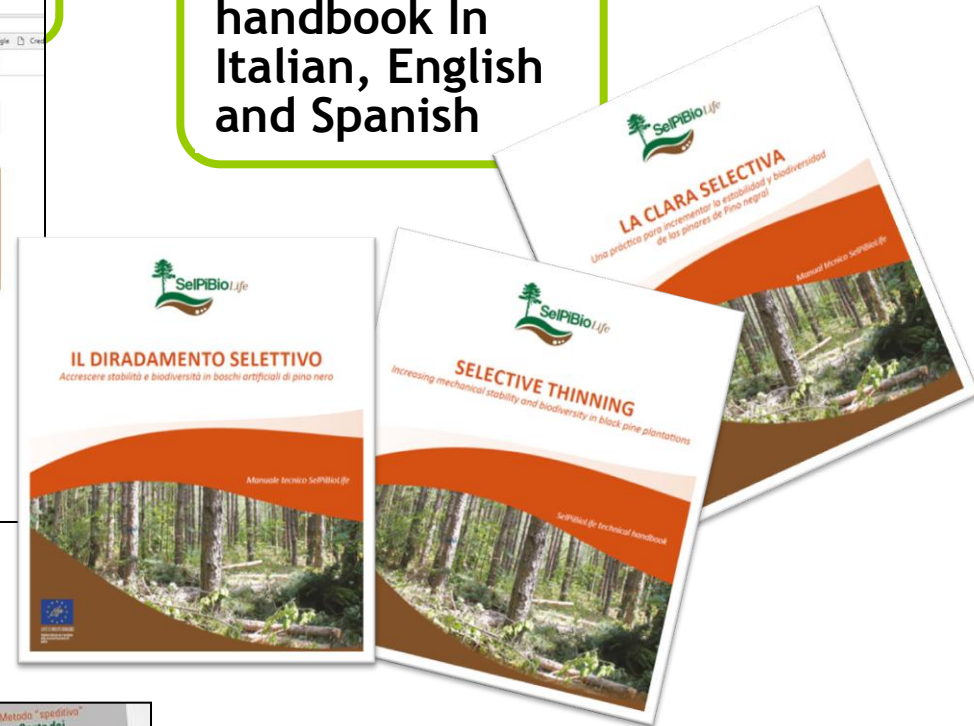


SelPiBioLife Products

Project's website: www.selpibio.eu



Technical handbook In Italian, English and Spanish



Project's Infographics



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LIFE/BIO/AT/000282

Prodotto realizzato con il contributo della Commissione Europea LIFE dell'UE

SelPiBioLife Products

Brochure



Video

I diradamenti selettivi nel Progetto SelPiBioLIFE



SelPiBioLife Products

Bulletin



Articles

SelPiBioLife per i popolamenti di pino nero
Una strategia selvicolturale per pinete artificiali con funzioni e destinazioni diverse

di Paolo Caserio, Maurizio Macchi, Mariella Piuma

SelPiBioLife è un progetto finalizzato a dimostrare gli effetti positivi di uno specifico trattamento selvicolturale (il diradamento selettivo) sull'accrescimento delle piante, la stabilità dei soprassuoli e la biodiversità a livello di sottobosco e suolo. In questo contributo si mostrano i primi risultati del diradamento selettivo rispetto a quello tradizionale in due pinete diverse per caratteristiche, funzioni e destinazioni future.

In Apprendo la politica forestale pubblica del secolo scorso si è basata soprattutto sul ricupero di terreni montani privi di vegetazione o in stato di degrado. L'attività selvicolturale si è concentrata in particolare sul rimboscimento delle pendici. Lo spazio maggiormente impiegato è stata il pino nero, arbore con caratteristiche ecologiche adatte alla colonizzazione dei terreni montani. Il fenomeno è stato massiccio ed è avvenuto in tempi rapidi. La superficie relativa ai boschi di pino nero dell'Appennino centro settentrionale (dalla Liguria all'Abruzzo) è oggi pari a circa 6.700 ha. Di questi esemplari il 9% sono nello stadio evolutivo di porticcioli, il 64% di giovani fustate, il 42% di fustate mature (IACOPO, 2006).

Le pinete appenniniche sono generalmente monocolturali (soprattutto pino laricio e pino nero matricato nelle stazioni meno fertili) e monoclonali.

Negli ultimi anni c'è stata una vivace discussione sul ruolo delle pinete e sulla loro destinazione futura. Da un lato si è stata ampiamente riconosciuta la loro positiva funzione pioniera, dall'altro sono state manifestate critiche sull'impiego massiccio della specie a scapito della biodiversità a scala locale e paesaggistica. Quest'ultima corrente di opinione ha portato ad un diffuso "favore antigino" secondo la felice definizione di Giovanni Berruti (2000), che si è concentrato in particolare nella favorevole "naturalizzazione" dei popolamenti di pino anche a stadi evolutivi giovani della pineta. Alcuni regolamenti forestali regionali hanno

annullato questa tendenza. Emblematico è il caso di quello della Toscana dove le fustate di pino nero sono trattate con un turno minimo di soli 40 anni (Giovanni 2010).

Nonostante la loro apparente omogeneità strutturale, le pinete di impianto di pino nero possiedono peculiarità tali da giustificare localmente diverse funzioni prevalenti e conseguenti strategie specifiche. Ciò accade non solo nell'ambito della proprietà privata, ma anche nella proprietà pubblica.

Obiettivo di questo contributo è quello di riportare l'esperienza ed alcuni risultati del Progetto SelPiBioLife che ha dimostrato l'opportunità di una strategia selvicolturale in due pinete diverse per storia, caratteristiche ambientali, funzioni principali e destinazioni previste.

Sherwood | 228 Marzo 2017 | 17



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SelPiBioLife Products

Technical meetings



Networking





Thank you