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LIVINGAGRO

Exploiting the potential of local olive genetic resources to face the future climatic challenges and develop new olive growing strategies based on agro-forestry approaches

Luciana Baldoni

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- Mediterranean climate change is causing a **decrease in water availability**, in terms of rainfall, irrigation resources and progressive **salinization** and **extreme meteorological events**, leading to reducing suitable crop areas and threatening yields and oil quality

- To support olive production, it is necessary to develop rational and innovative uses of the **genetic and environmental resources available at field level**

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Local varieties represent a high-value source of variability, empirically selected by farmers and naturally tested by the environment

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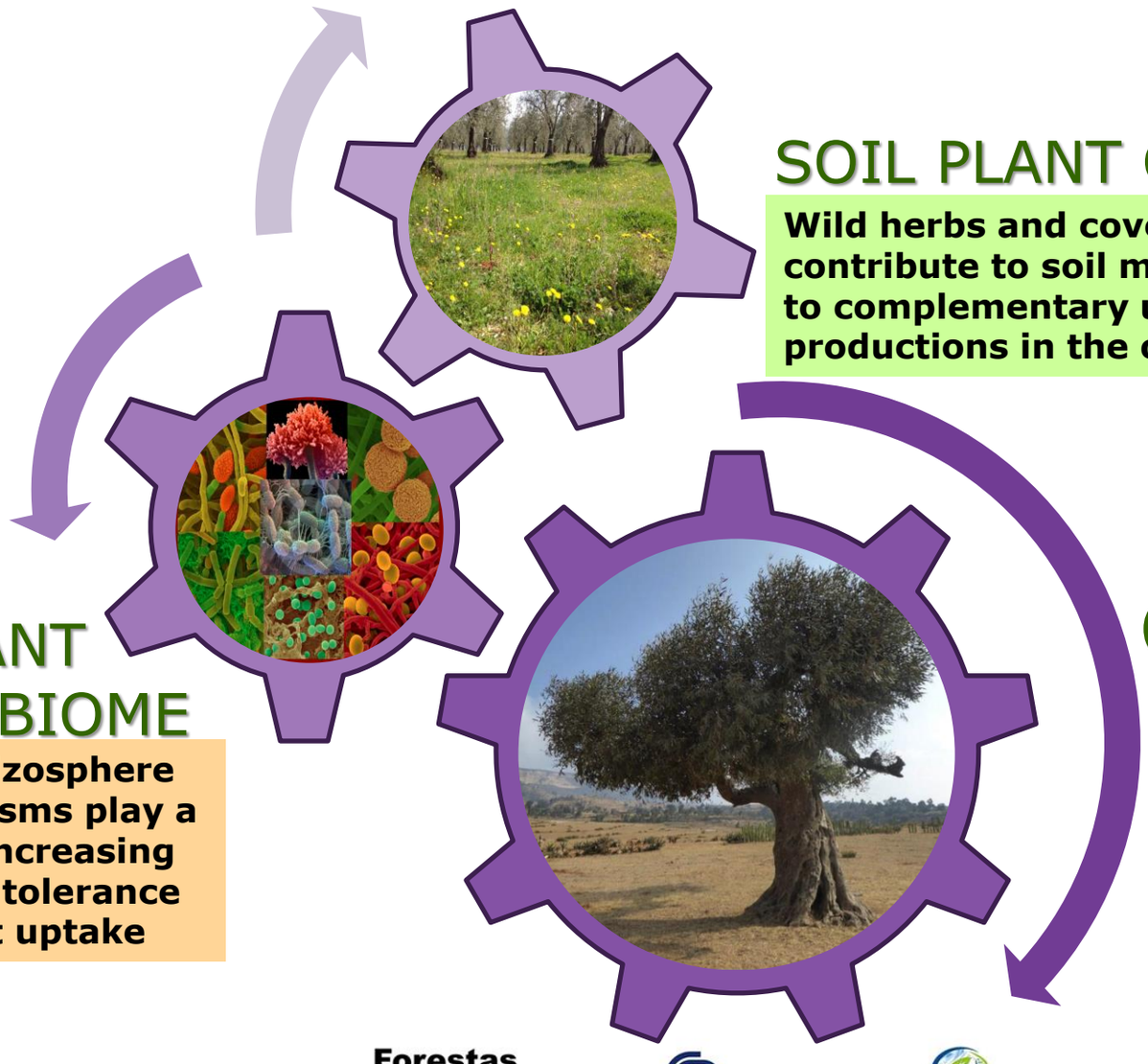
Biological components affecting plant response to the agro-environment



SOIL PLANT COVERAGE

Wild herbs and cover crops contribute to soil management and to complementary uses and productions in the olive grove

PLANT MICROBIOME

Root and rhizosphere microorganisms play a key role in increasing plant stress tolerance and nutrient uptake

OLIVE GENOTYPES

Olive trees play a key role in plant-environment interactions and in energy-water-chemical consumptions

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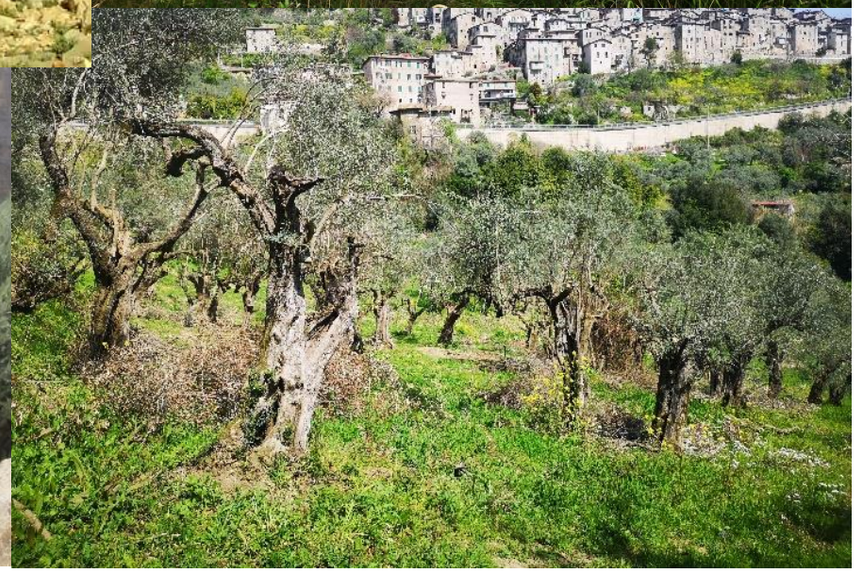
Exploiting the olive genetic resources to redesign environmentally friendly groves

GENETIC RESOURCES

- Local varieties
- Wild olives
- Ancient trees



- high salinity levels
- high temperatures
- low water resources

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Local varieties

They survived for hundreds of years under adverse pedo-climatic conditions

They represent a remarkable reservoir of variation with environmental and agronomical interest

They have been evaluated, selected and preserved by farmers

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Wild olives

Wild olives and other related taxa represent a **source of variability** for **drought, salt or anomalous soils tolerance, pathogen resistance and tree vigor**

Wild olives can be:

- ❑ used directly as **rootstocks** of the varieties
- ❑ used as parents in **breeding programs**

The first tests to evaluate their performance are underway

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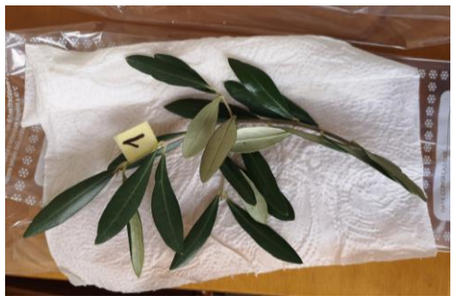
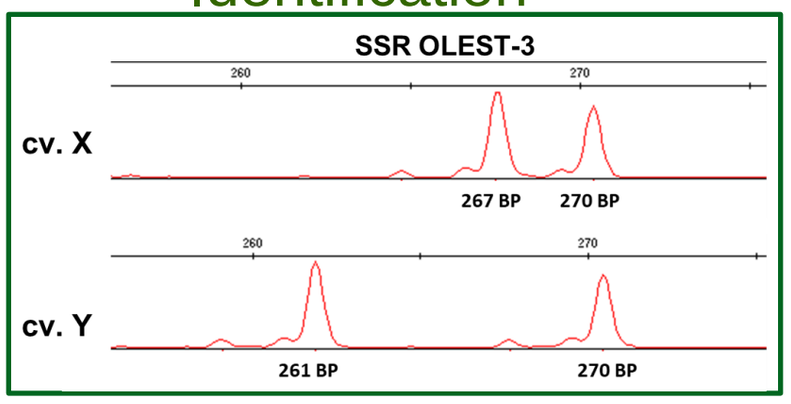
Process of local unknown varieties recovery

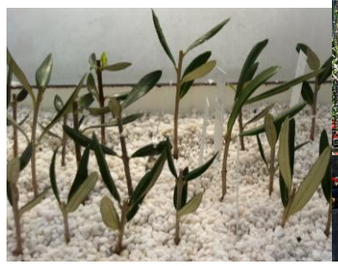
Exploration

Sample collection



Identification





Propagation

Lab evaluation

Field evaluation

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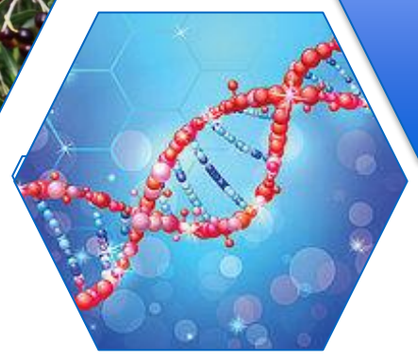
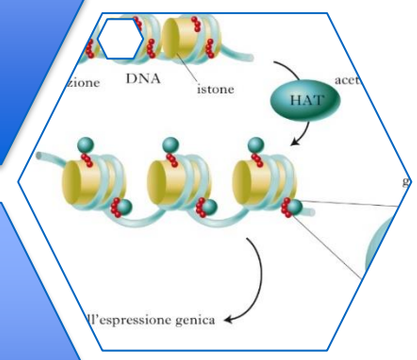
Recently published olive genomes, QTL regions and candidate genes linked to abiotic stress tolerance, will represent unprecedented study tools

PHENOTYPING



GENOMICS

TRANSCRIPTOMICS



EPIGENOMICS

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Development of genomic and molecular tools to apply genomics-assisted breeding

Direct plant phenotyping	Development of genomic and molecular tools
Plant growth, plant production	Genome-Wide Association Studies
Tolerance to drought, salt, cold	Genetic mapping
Resistance to the main phyto-sanitary emergencies	Identifiying gene determinants

- Expand knowledge on the molecular bases of **plant production**, **plant metabolites**, **tree architecture** and **stress tolerance**
- Identify **molecular markers** and **candidate genes** to **assist varietal selection**

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CONCLUSIONS

The exploitation of olive genetic resources at field level and selection of local varieties and wild plants, taking advantage of field biodiversity should allot to:

- ❖ Promote new olive crop systems,
- ❖ Recover and optimize traditional practices
- ❖ Convert intensive olive cultivation approaches into sustainable cultivation systems, able of supporting olive production in a scenario of environmental constraints, improving product quality and guaranteeing farmers' income

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Thank you very much for your attention!

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