Key concepts for ecological transition in olive farming

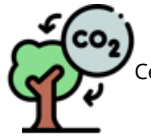
An useful tool for technical advisers and environmental educators

A product of the SUSTAINOLIVE Project
www.sustainolive.eu

Bio-diversity 

Capacity building 

Carbon footprint 

Carbon sequestration 

Certifications 

Circular economy 

Climate change 

Climate change mitigation 

Composting 

Closing nutrient cycling 

Cover crops 

Cultivars 

Cultural ecosystem services 

Ecosystem services 

Endocrine disruptors 

Integrated pest management 

Inter-cropping 

Integrated production 

Natural enemies 

Olive mill pomaces 

Olive pomace compost 

Organic farming 

Panel test 

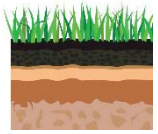
Plant protection products 

Provisioning ecosystem services 

Regulating ecosystem services 

Responsible consumption 

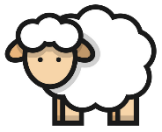
Soil fertility 

Soil role 

Supporting ecosystem services 

Surface runoff 

Sustain-ability 

Sustainable technological solutions 

Unsustain-ability 

Waste valorization 

Water overexploitation and pollution 

Weeds 

Idea, design and layout by Jose Liétor Gallego

SUSTAIN OLIVE
PRIMA
IN THE MEDITERRANEAN AREA
Co-funded by the Horizon 2020 Framework Programme of the European Union
This project is part of the PRIMA programme supported by the European Union

This file contains a compilation of slides specifically designed to educate and make Mediterranean olive farmers aware of the need to incorporate sustainable technological solutions into their businesses. **Click on the icons** to navigate through the document.

The role of sustainable technological solutions in closing nutrient cycling

PATHWAYS TO NUTRIENT LOSS

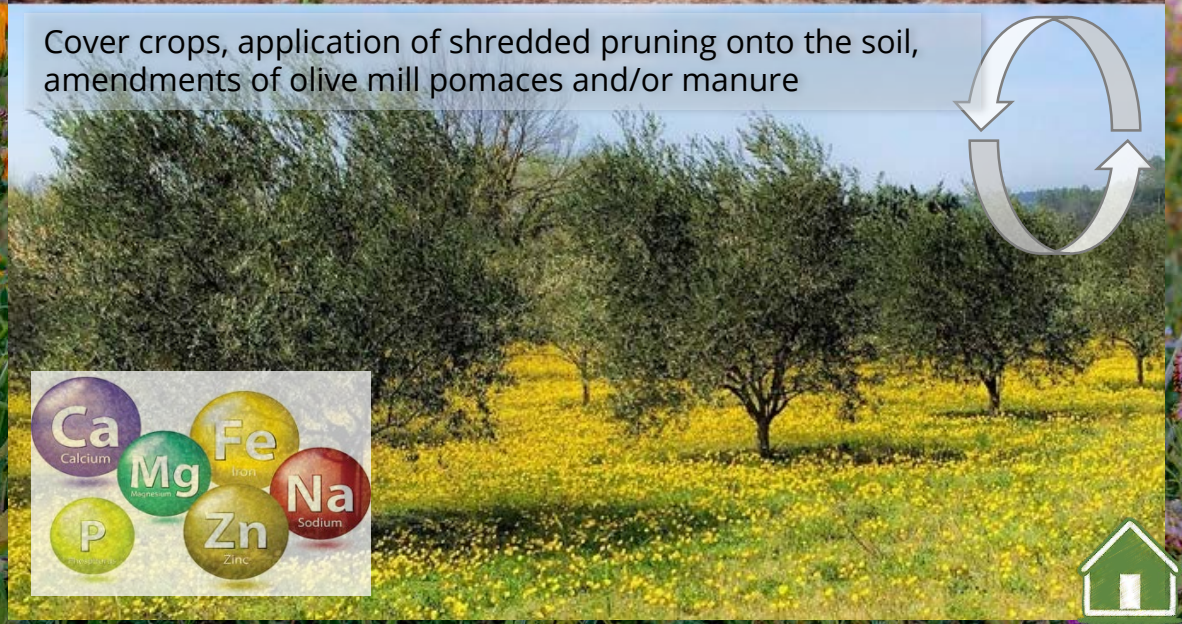
1. Unharvested nutrients are washed away by surface runoff
2. High erosion rates causes the loss of surface soil along with its nutrients
3. Productivity depends on organic inputs in the form of N based synthetic fertilizers

PATHWAYS TO CLOSE NUTRIENT CYCLING

1. Unharvested nutrients are retained and recirculated
2. Erosion and leaching are minimized so nutrients remain available for trees
3. The farm stops depending on external inputs and considerably improves its self-sufficiency
4. Unharvested nutrients end up being available for roots so contributing to the next vegetative period and closing the nutrient cycle

No cover crops, no application of shredded pruning onto the soil, no amendments of olive mill pomaces and/or manure

Cover crops, application of shredded pruning onto the soil, amendments of olive mill pomaces and/or manure



Soil provides olive farms an unvaluable richness

SOIL

Intensive use of tillage and aggressive removal of vegetation covers led to...

Loss of organic matter

Decreased ability to fix atmospheric CO_2

Degradation of soil structure

Impoverishment of soil microbiota

Decreased the potential to reduce climate change

Reduced rainfall infiltration rate and increased runoff

Increased EROSION RATES and desertification

Factors conditioning soil fertility

Olive groves applying sustainable technical solutions

- Cover crops
- Tillage reduction
- Promoting soil biodiversity
- Landscape features
- Grazing livestock
- Legumes intercropping
- Organic fertilizers
- Pesticides and herbicides reduction

- Its consistency and depth allow a good development and fixation of the roots
- It is sufficiently airy
- There are barriers/practices preventing from erosion
- It contains/provides the nutrients that vegetation needs
- It is capable of absorbing and retaining water, keeping it available for plants
- It does not contain/is prevented from toxic substances

Olive groves that do not apply sustainable technical solutions

- Bare soils
- Intensive tillage
- Hostile to soil biodiversity
- Monotonous landscape
- No livestock
- Monoculture
- Chemical fertilizers
- Intensive pesticides and herbicides

WATER

Overexploitation of water resources leads to...

- Low availability of water, especially in drought periods
- Presence of synthetic plant protection products

Water pollution → Nitrate contamination and soil salinization

In Jaen Province (Spain), olive groves lose about **3-4mm of thickness per year, which amount** a total loss of **40-60 tons of soil per hectare**. The water storage of these soils is less than half that the uncultivated soils.

How much irrigation is required per hectare to compensate for this?

250 m³ = 250.000 l

EL PAÍS — ANDALUCÍA

La contaminación del agua con herbicidas obliga a 20.000 vecinos de Jaén a abastecerse con cisternas

Salud confirma la presencia de terbutilazina en el pantano del Dañador

GINÉS DONAIRE

Jaén · 24 JUN 2004 - 00:00 CEST

Unos 20.000 vecinos de siete pueblos de la comarca jiennense de El Condado se abastecen desde ayer con camiones cisterna tras decretar la Delegación de Salud, la noche anterior, no apta para el consumo humano el agua procedente del pantano del Dañador por la presencia de un herbicida usado en la cura de los cultivos agrícolas. Se trata de un nuevo corte en el suministro en una

Comunidad de Regantes Genil-Cabra

COLECTIVIDAD DE SANTAELLA

SERVICIO LOCAL DE ASESORAMIENTO AL REGANTE

SEPTIEMBRE 2005

BOLETÍN INFORMATIVO

Entidad asesorada por:

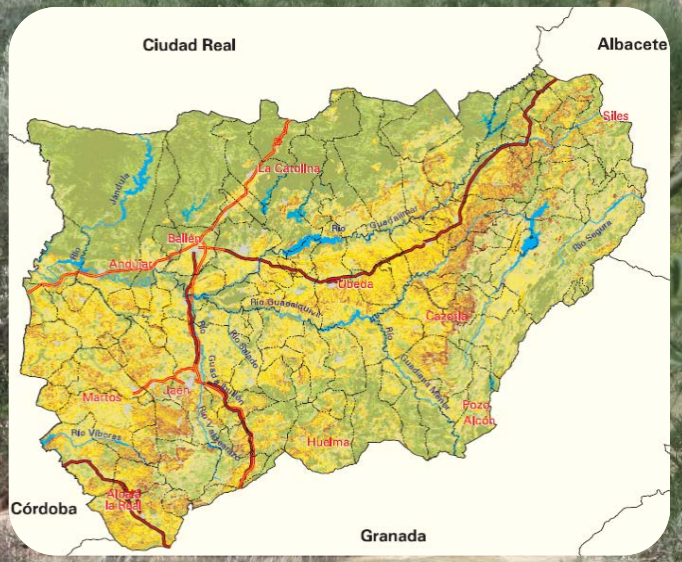
AGROBOLETÍN Nº 19

PROHIBIDO EL USO DE TERBUTILAZINA EN EL TERRITORIO NACIONAL TRAS LA PROPUESTA PLANTEADA POR ANDALUCÍA .

Contamination by Terbutylazine in the Dañador reservoir (Jaen, Spain, 2004) and its further ban

(click on the press releases for extra information)

THE DREADFUL PROBLEM OF
EROSION



Data from National Inventory of Soil Erosion 2002-2012, Jaen Province, Spain (INES, 2006)

In Jaen Province (Spain)

Annual average rate
32 tons
per hectare

More than 1.000 km^2
with extreme annual rates
>100 tons
per hectare

Till **500 tons**
per hectare
annually in gullies

HOW TO MINIMIZE RUNOFF

SUSTAINABLE PRACTICES	ACTIONS
Avoid soil compaction	1. Do not drive with machinery on wet floors. 2. Prevent the formation of compaction using the appropriate machinery for the needs of the crop. 3. Use cover crops with taproots. 4. Use low pressure tires.
Control the traffic of machinery	1. Use the same track when bare or semi-bare soils are involved. 2. Implement a vegetative cover on the tracks.
Promote cover crops	1. Maintain a living green groundcover between the rows of trees. 2. Cover the ground with plant debris if the implementation of living cover crops is not possible.
Establish efficient safety bands	1. Implement multifunctional margins on the borders. 2. Implement of multifunctional margins in the valley areas. 3. Implement multifunctional margins on the banks of water courses.
Manage multifunctional margins correctly	1. Minimize the traffic of machinery through them. 2. Do not carry out chemical treatments or fertilizers. 3. Keep the vegetation above 15 cm.

BIODIVERSITY

A monospecific cultivation model that removes the rest of plant species with aggressive chemicals leads to...

Loss of links in food chains

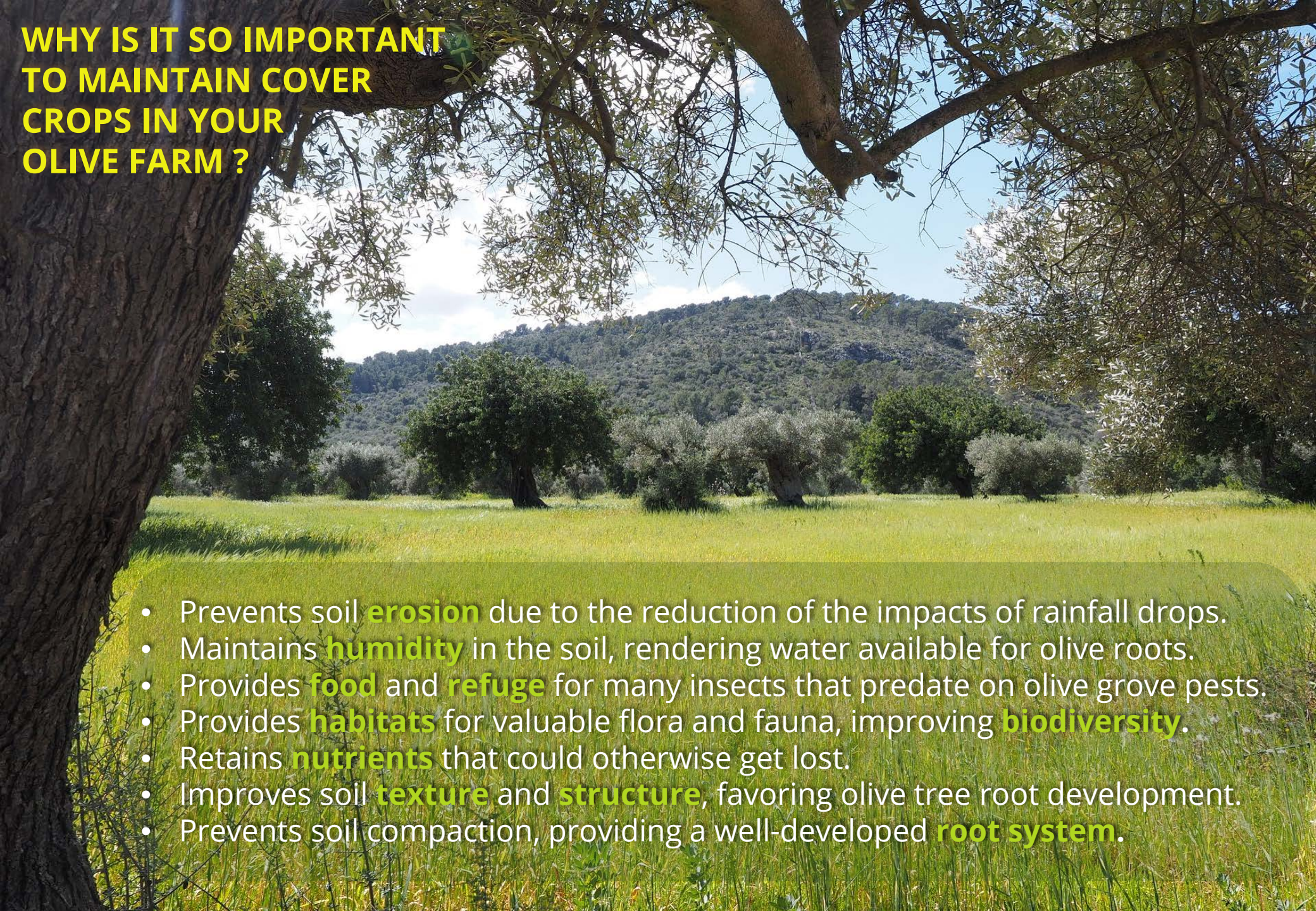
Reduction of microhabitats

Biodiversity loss

Dependence on chemical inputs due to lack of natural enemies of pests

Landscape homogenization and degradation

WHY IS IT SO IMPORTANT TO MAINTAIN COVER CROPS IN YOUR OLIVE FARM ?



- Prevents soil **erosion** due to the reduction of the impacts of rainfall drops.
- Maintains **humidity** in the soil, rendering water available for olive roots.
- Provides **food** and **refuge** for many insects that predate on olive grove pests.
- Provides **habitats** for valuable flora and fauna, improving **biodiversity**.
- Retains **nutrients** that could otherwise get lost.
- Improves soil **texture** and **structure**, favoring olive tree root development.
- Prevents soil compaction, providing a well-developed **root system**.

NATURAL COVER CROPS

by taking advantage of the vegetation that sprouts **spontaneously** in the olive grove.

SEEDED COVER CROPS

by planting species of grasses and legumes that could **benefit** the soil, biodiversity and thus also the crop itself.

LIVESTOCK MANAGEMENT

Several animal species are suitable for the **management** of cover crops: sheep, horses, chicken, turkeys ...

You should **not fear** the loss of leaves and branches from the lower part of the olive trees because they are **scarcely productive**.
Also, as they are consumed at the beginning of spring, so that the loss of biomass **can be recovered** through the more productive upper branches.

ADVANTAGES

- While feeding, livestock **manures** the ground.
- When **legumes** are present, livestock will spend more time eating them (not browsing olive leaves) due to their high protein content.
- Livestock management is the **cheapest** and most **efficient** method to control cover crops, specially in organic olive groves.

The olive grove is more profitable if it is inter-cropped with other crops

This is one of the most remarkable conclusions of the European project "Diverfarming"

DIVERFARMING
H2020 728003

If **oilseeds** for livestock, **aromatic**, **medicinal plants** or even **aloe vera** are inter-cropped between olive rows, **olive grove yield grows.**

BENEFITS OF INTERCROPPING

- **Diversity and stability of fields**
- **Reduction in chemical/fertilizer application**
- **A complementary sharing of plant resources, such as nitrogen from N fixing plants**
- **Weed suppression, and a reduction in susceptibility to insects and diseases**

IMPORTANT WEEDS IN OLIVE ORCHARDS IN NORTHERN AND SOUTHERN SPAIN

	Area	Family	Genus & Species	Common Name
	North Spain South Spain	ASTERACEAE	*Conyza canadensis*	Horseweed
	North Spain	BRASSICACEAE CRUCIFERAE	*Diplotaxis erucoides*	White rocket
	South Spain	BRASSICACEAE CRUCIFERAE	*Diplotaxis virgata*	Sand mustard
	North Spain	BRASSICACEAE CRUCIFERAE	*Sinapis arvensis*	Field mustard
	North Spain South Spain	CARIOPHYLACEAE	*Stellaria media*	Common chickweed
	South Spain	CUCURBITACEAE	*Ecballium elaterium*	Squirting cucumber
	North Spain South Spain	MALVACEAE	*Malva sylvestris*	Common mallow
	North Spain South Spain	POACEAE	*Lolium rigidum*	Annual ryegrass
	North Spain	URTICACEAE	*Urtica dioica* *Urtica urens*	Common nettle Annual nettle

It is important to remember that weeds are so because they make olive harvesting difficult.

If properly managed, they can be a source of wealth for the olive grove involving:

- **Erosion** control
- Conservation of **biodiversity**
- Resilience against **climate change** (the soil of an olive grove with herbaceous cover sequesters twice as much CO_2 as one with bare soil)

ENDOCRINE DISRUPTORS

They are **molecules of industrial origin** capable of **interfering** with the normal functioning of **the hormonal system**.

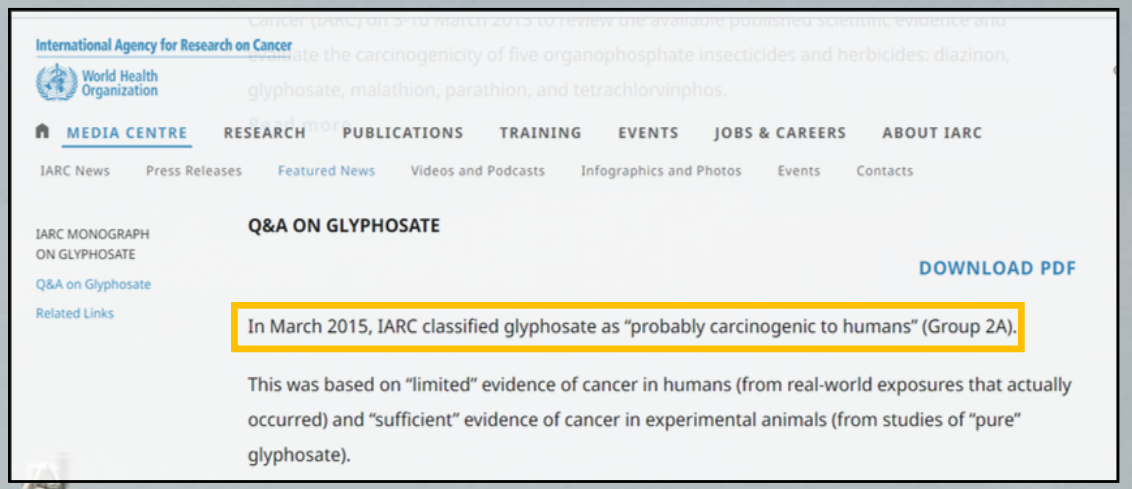
They behave like estrogens or androgens, so **they act like sex hormones** by mimicking or blocking the action of endogenous hormones.

It has been proved that they are related to **various types of cancer** and also alterations at different levels:

- **Reproductive and hormonal**
- **Neurological**
- **Immunitary**
- **Cardiopulmonar**

A significant percentage of the pesticides used in the olive grove have disruptive effects. One of the most controversial is the widespread **glyphosate (Roundup),** classified by the WHO as **probably carcinogenic**.

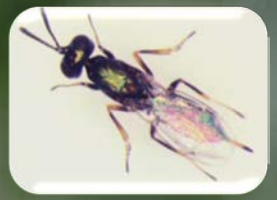
Click on the press releases for extra information



NATURAL ENEMIES OF OLIVE FRUIT FLY *(Bactrocera oleae)*

HYMENOPTERA

Opius concolor (Braconidae)
Endoparasitoid of various Diptera.



Pnigalio mediterraneus (Eulophidae)
One of the most active parasitoids of olive fly larvae.

Eupelmus urozonus (Eupelmidae)
Polyphagous ectoparasite associated with olive trees.

Eurytoma martellii (Eurytomidae)
A very common ectoparasite of the olive fly.

Cyrtoptyx latipes (Pteromalidae)
Rare ectoparasite of larvae of *B. oleae*.

DIPTERA

Lasioptera berlesiana (Cecidomyiidae)
Oophageal predator (eats the eggs) of various insects including *B. oleae*.

Integrated pest management involves to answer these questions

1

Which is the economic tolerance threshold?

is the level of the pest population that, when exceeded, requires a limiting intervention, without which the crop runs the risk of suffering losses greater than the cost of the treatment.

2

Which is the economic damage level?

Is the lowest population density of the pest that causes economic damage.

3

Which is the economic treatment threshold?

is the level of the pest population at which control measures must be applied to prevent a growing pest population from causing economic losses (quantity and/or quality).

4

When and how to make the treatment?

It depends of many factors:

- **The phenological stage**
- **The geographical area**
- **The presence or absence of natural enemies**
- **The olive variety**
- **The age of the plant**
- **The climate**
- **The diseases of which the pest can be a vector**
- **The foreseeable price of the harvest**
- **The cost of treatment, etc.**

Some key ideas to consider before using chemical products in olive groves

Olive farmers usually apply routine chemical treatments to avoid the appearance of pests. But in many cases, those pests never arise so the money ends up being wasted.

Technical information is available on the spatial and temporal evolution of insects that can cause a pest. Consulting this information saves the farmer time and money, since it is possible to anticipate if there is a real risk of a pest occurring or not.

Remember that chemical products also kill beneficial insects that naturally control pests.

COMPOSTING

A GOOD METHOD TO TAKE ADVANTAGE OF NUTRIENT-RICH OLIVE OIL BY-PRODUCTS

COMPOST is a **fertilizer** produced by the decomposition of organic wastes, in this case olive mill pomaces.

It has been scientifically proven that the annual production of any olive grove would be guaranteed if 10.000 kilograms of olive mill pomaces compost per hectare were applied.

In fact, the organic matter content of olive mill pomaces compost is similar to that in the compost sold for gardening.

OLIVE MILL POMACES
AN INEFFECTIVELY USED RESOURCE

Once olives are milled to extract olive oil, a waste sub-product called `**olive mill pomace**´ is obtained
(800 kg per every 1000 kg of olives, approximately).

Olive mill pomaces are a mix of **fatty** remains, vegetation **waters** and solid parts of the olives, including **pits** and **skins**.

They contain a considerable amount of **nutrients** that the farmer can benefit from. Ultimately, it is an **economic resource** that is often wasted.

HOW ARE OLIVE MILL POMACES COMPOSTED?

1. Fresh olive mill pomaces are stacked on a flat and impermeable surface (to avoid the leaching of toxic substances).

2. Nitrogen-rich materials like olive leaves, animal blood or slurry are added (to allow for microorganisms to initiate decomposition).

3. The stacks must be regularly turned over and watered to avoid reaching high temperatures.

4. After around 9 months the olive mill pomaces will have turned into a dark crumbly material with the smell of mulch. Now it is ready to be used.

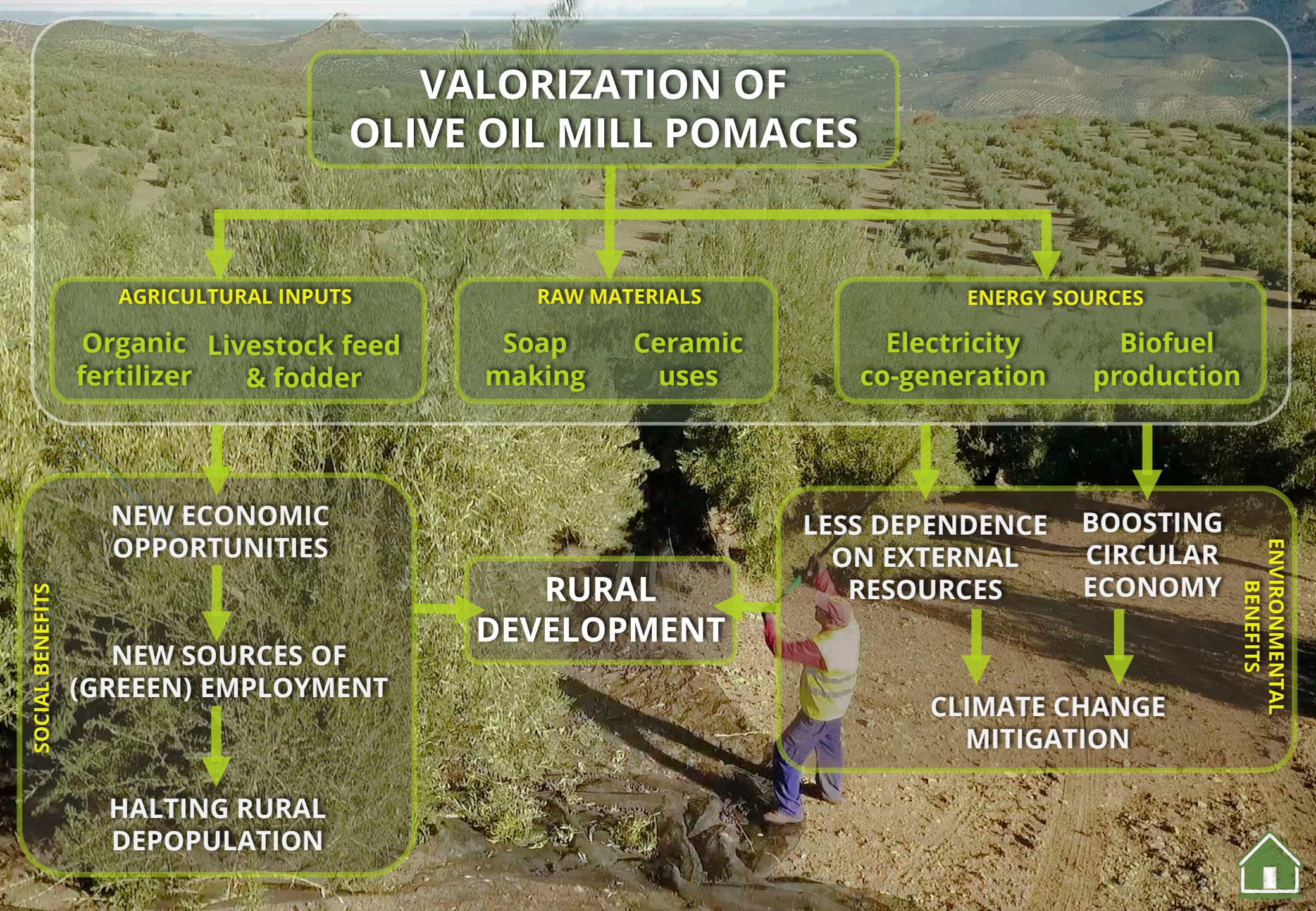
POTENTIAL BENEFITS
OF APPLYING OLIVE MILL POMACES TO OLIVE GROVE SOILS

- Fosters soil **aeration** and **drainage.**
- Improves the ability of soils to **retain water**.
- Facilitates aggregation with clays that **prevent soil erosion**.
- Acts like a **sponge**, retaining and slowly liberating key **nutrients** for olive trees.
- Allows the proliferation of **microorganisms** that improve the availability of **nutrients** for olive trees.

Producing olive pomace mill compost costs **less than half of the retail price** of common chemical fertilizers.

What are the quality standards for olive mill pomace composting?

Ideally, you should try to obtain a composted olive mill pomace with a **1/20 Nitrogen/Carbon** ratio. If necessary, consult a qualified technician.


VALORIZATION OF
OLIVE OIL MILL POMACES
AGRICULTURAL INPUTS
Organic fertilizer
Livestock feed & fodder
RAW MATERIALS
Soap making
Ceramic uses
ENERGY SOURCES
Electricity co-generation
Biofuel production
SOCIAL BENEFITS
NEW ECONOMIC OPPORTUNITIES
NEW SOURCES OF (GREEEN) EMPLOYMENT
HALTING RURAL DEPOPULATION
RURAL DEVELOPMENT
LESS DEPENDENCE ON EXTERNAL RESOURCES
BOOSTING CIRCULAR ECONOMY
CLIMATE CHANGE MITIGATION
ENVIRONMENTAL BENEFITS

Some widespread certificates

PDO stands for "Protected Designation of Origin" or "Denominazione di Origine Protetta" (**DOP**) in Italy.
For a particular area to be awarded the PDO/DOP status, it must be producing an outstanding olive oil and have a good reputation. For an olive oil to qualify for the PDO/DOP name and logo, it must be grown, produced and bottled in the designated area, but it must also meet strict requirements in terms of cultivars, method of production and overall quality.

PGI stands for "Protected Geographical Indication" or "Indicazione Geografica Protetta" (**IGP**) in Italy.
This status is usually awarded to a larger geographical area, but the rules are less exacting than PDO/DOP. An olive oil carrying the PGI/IGP logo must have at least one characteristic associating it with the PGI/IGP area and at least one stage of the production process must be carried out there.

TGS stands for "Traditional Specialty Guaranteed". These products are linked to traditional production methods rather than the region in which they were made. They should be produced either from traditional materials or produced using traditional techniques.

Some of the most important olive oil certifying entities

International Olive Oil Council (IOOC)

California Olive Oil Council (COOC)

Star-K Kosher Certification

Good Housekeeping Seal

Istituto Mediterraneo di Certificazione (IMC)

Safe Quality Food Institute (SQFI)

The Extra Virgin Alliance Mark of Quality and Authenticity

Olivares Vivos

Click on certifying entities for extra information

Around **1,200 different olive varieties** are known in the world, although there are only **139 that account for 85% of world production**.

INTEGRATED PRODUCTION ANDALUSIA

Issue	Conventional	Integrated production
Regulations	Regional, national and international	Regional and national
Certificate issuance	No	Yes
Plant-protection products	No restricted use	Use restricted to authorized active materials
Production factors	It does not integrate them all	All integrated
Environment	The economic benefit is the highest priority	It takes into account both the health of the environment and the producer
Quantity & Quality	Quantity is prioritized	Quality is prioritized
Sustainability	No	Yes (moderate)

Differences between conventional and integrated production olive groves

Benefits of the olive grove being managed organically

Agro environmental benefits:

- It uses organic fertilizers and minimum tillage, which involves an **improvement of soil fauna and flora populations.**
- It avoids soil erosion and boosts **natural soil fertility** without using chemical products or pesticides.
- The **underground water is not polluted**, as the fertilizers used are composts, animal manure, green manure, etc.

Nutritious benefits of organic extra virgin olive oil:

- It is a **safe, natural and healthy** product.
- Organic extra virgin olive oil is **the tastiest** because its nutritious properties are maintained intact.
- Organic products are subjected to an **additional certification** which guarantees the authenticity and traceability of its organic origin.

CAAE
AGRICULTURA ECOLÓGICA

USDA ORGANIC

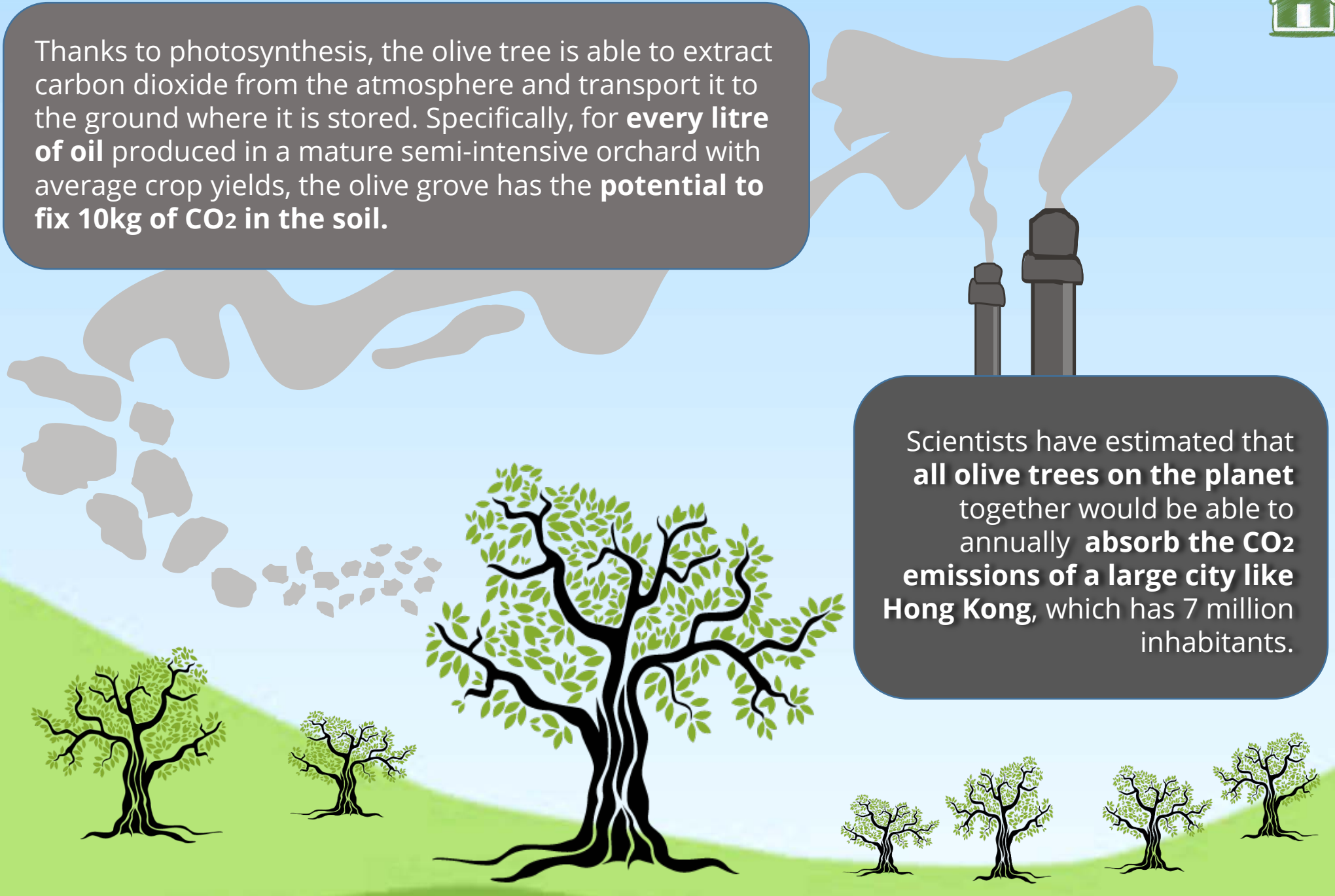
OLIVE OIL FLAVORS

- Fruity of green and/or ripe olives
- Fruity of other fruits (tomato, artichoke, banana, fig leaf, asparagus, etc.)
- Green and/or ripe apple
- Green (leaf, grass, stems, branches)
- Bitter
- Spicy
- Almond (green and/or ripe)
- Nutty
- Sweet
- Rough-Astringent

SMELLS INDICATING DEFECTS IN OLIVE OIL

- Atrojado/Borras (manure, old cheese)
- Winey/vinegary (wine, vinegar)
- Stale (stale bacon, stale pipes)
- Mold/damp/earthy (ground, damp, mushrooms, etc.)

Thanks to photosynthesis, the olive tree is able to extract carbon dioxide from the atmosphere and transport it to the ground where it is stored. Specifically, for **every litre of oil** produced in a mature semi-intensive orchard with average crop yields, the olive grove has the **potential to fix 10kg of CO_2 in the soil.**



Scientists have estimated that **all olive trees on the planet** together would be able to annually **absorb the CO_2 emissions of a large city like Hong Kong**, which has 7 million inhabitants.

What are **ECOSYSTEM SERVICES** ?

Those **BENEFITS** that ecosystems provide to society by improving people's **HEALTH**, **ECONOMY** and **QUALITY OF LIFE**

Some examples

- Production of clean water
- Soil formation
- Crops and timber
- Climate change mitigation
- Pollination .....

Our **future** depends to a large extent on human capacity to **adequately manage** ecosystem services

What main **sustainable**

management practices

can improve delivery of ecosystem services by olive farmers ?

Implementing temporary spontaneous or seeded cover crops

Crushing olive tree pruning waste

Applying organic fertilization

Integrating livestock

Promoting landscape diversity and heterogeneity

PROVISIONING
ecosystem services

Consisting of those **products extracted** from the environment to be directly **consumed by humans**:

- Food and timber
- Water (for agriculture and consumption)
- Energy resources (firewood, peat, lignite ...)
- Raw materials
- Minerals
- Genetic resources
- Medicinal resources

REGULATING
ecosystem services




Consisting of ecological processes that benefit us through their **regulatory mechanisms**, helping to mitigate some **global and local processes and impacts**:

- Climate regulation
- Water cycle regulation
- Improved air quality
- Soil erosion control
- Damage reduction from natural disasters
- Disease and pest control
- Maintenance of soil fertility
- Regulation and sanitation of water
- Pollination

SUPPORTING
ecosystem services

Consisting of ecological processes that aset the essential basis and structures **for remaining types of ecosystem services**:

- Water cycle
- Soil formation
- Primary production
- Photosynthesis
- Species habitat
- Conservation of genetic diversity
- Nutrient cycles

CULTURAL
ecosystem services

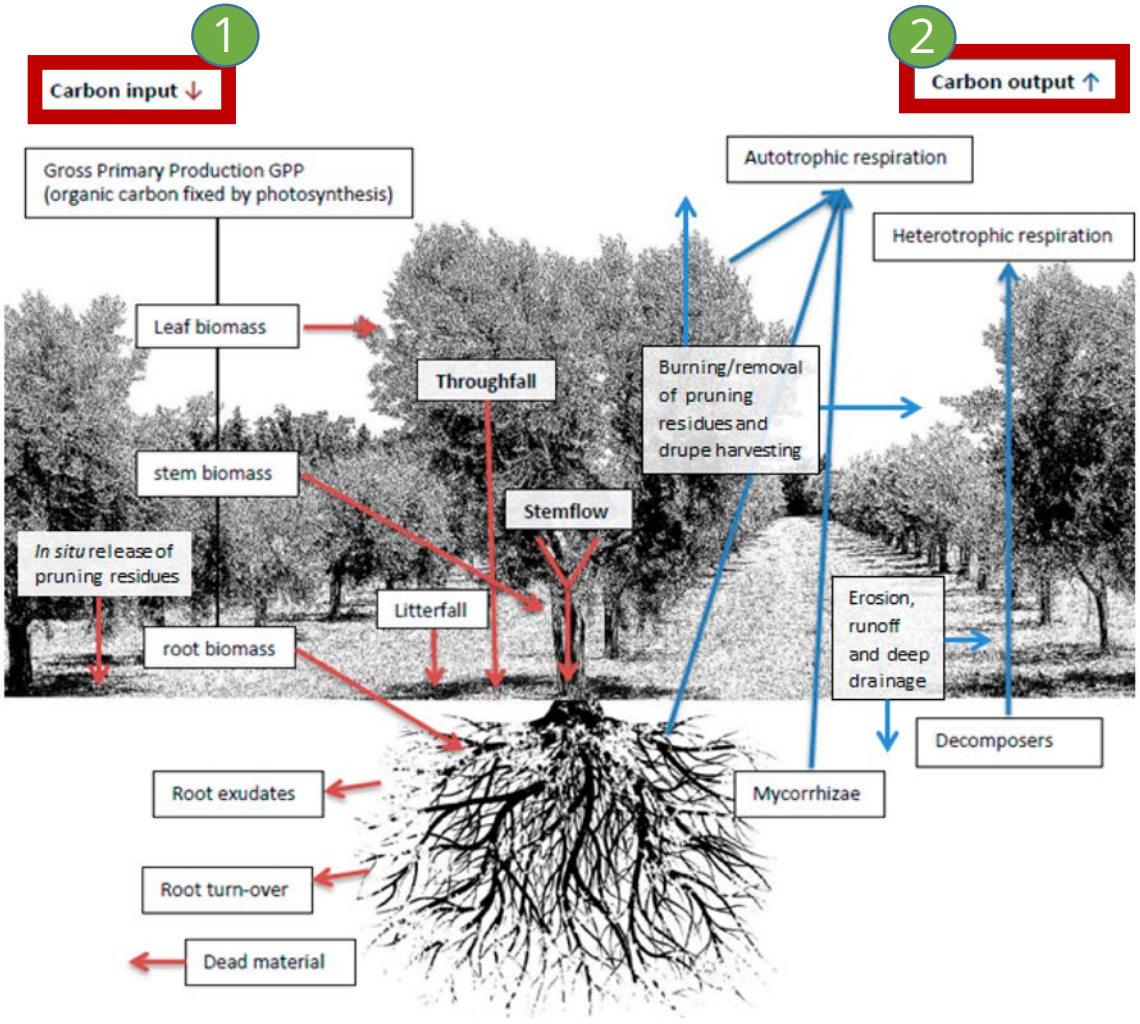
Consisting of those **non-material benefits** that human beings obtain through ecosystems:

- Educational values
- Cultural diversity
- Source of inspiration
- Spirituality and religious values
- Aesthetic and landscape values
- Social relationships
- Entrenchment to the land
- Cultural heritage
- Recreational and ecotourism services
- Scientific knowledge

CARBON FOOTPRINT IN OLIVE FARMING

1 When olive grove management involves sustainable technological solutions, the ratio C inputs/C outputs considerably increases. Olive farm becomes a net carbon sink.

2 When olive grove management does not involve sustainable technological solutions, the ratio C inputs/C outputs considerably decreases. Olive farm becomes a net carbon source.



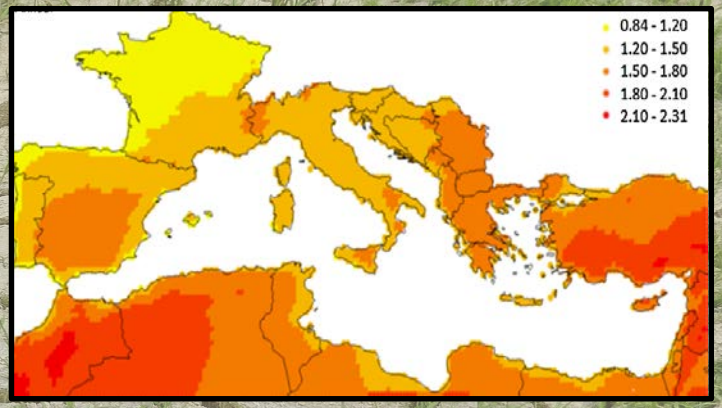
Picture credit: Sustainability Certification, a New Path of Value Creation in the Olive Oil Sector: The ITALIAN Case Study (click here to check the publication)

IMPACTS OF CLIMATE CHANGE ON MEDITERRANEAN OLIVE GROVES

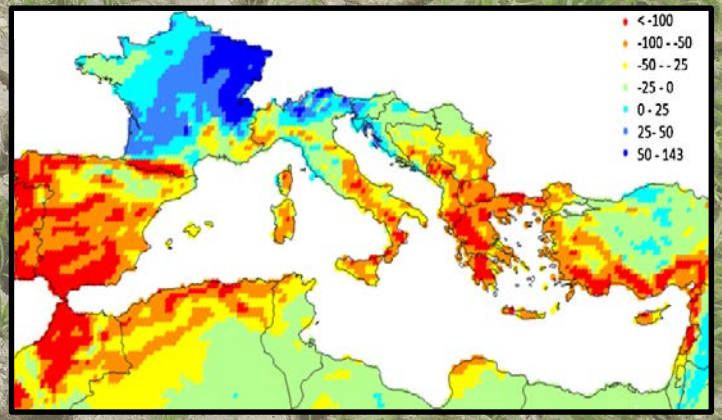
Mediterranean olive groves are located in one of the areas of the planet where the **consequences of climate change** in terms of increased temperatures and decreased precipitation **will be more pronounced**.

Unless urgent measures are taken in this regard, the **profitability of the olive grove will be considerably reduced** and only the larger companies that own vast latifundia will be able to adapt to the new climate scenario and the demands of a turbulent market.

Distribution of olive groves in the Mediterranean basin



Difference of annual mean precipitations (mm) between 2000 and 2050



Difference of annual mean temperatures (°C) between 2000 and 2050

HOW MAY OLIVE GROVES HELP TO MITIGATE CLIMATE CHANGE ?

ALTERNATIVE BIOMASS-BASED FUELS

Use of pomaces which can reach several environmental benefits:

- Contaminating waste disposal
- Reduction of greenhouse gases emissions
- Independence of external fuel supplies

Use of leaves and pruning debris

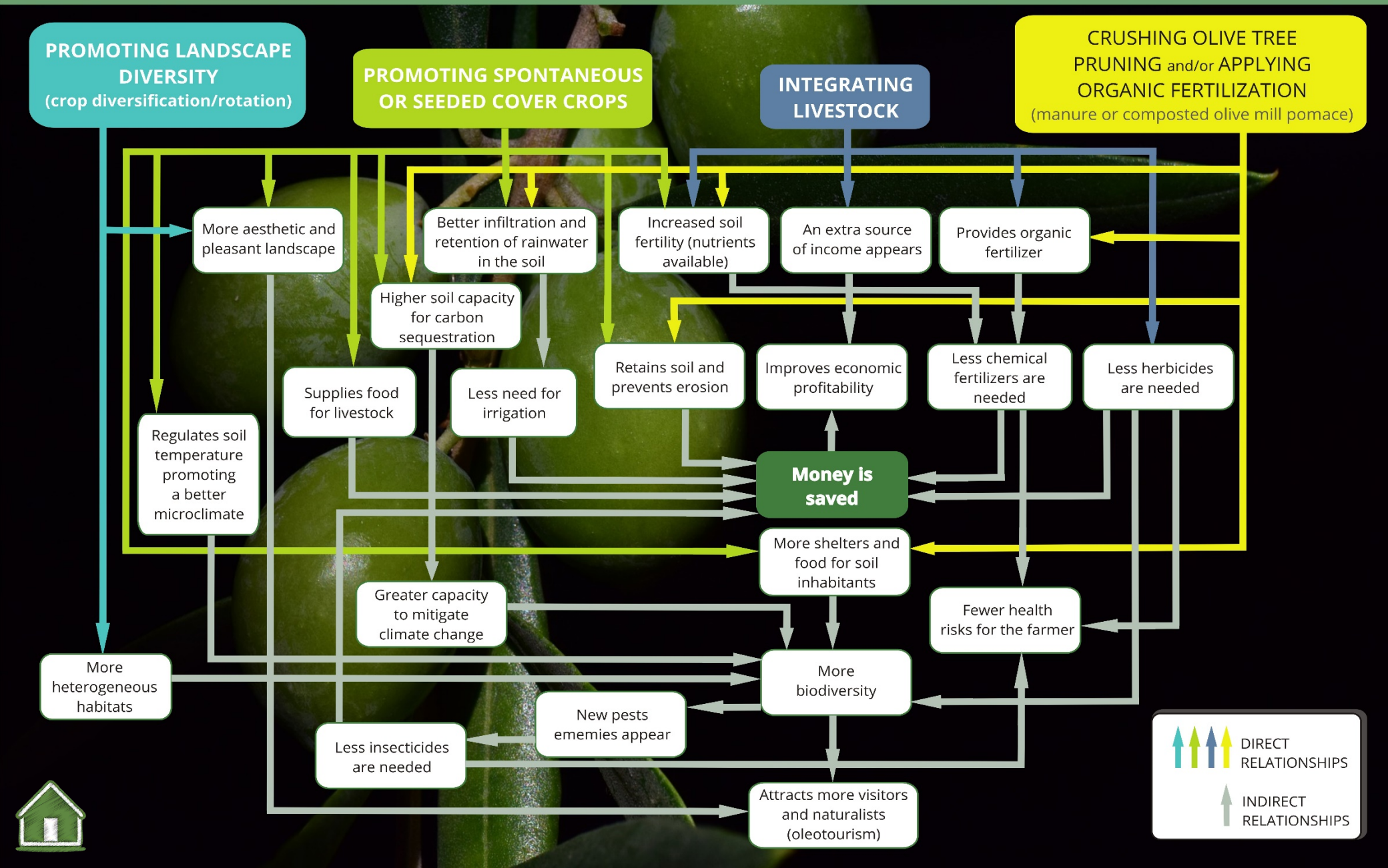
COGENERATION

Needs a high production volume to be economically viable

OPTIMIZATION OF ENERGY EFFICIENCY

- Oil mills temperatures adjust and control
- Optimizing energy in the wet pomace drying
- Periodic maintenance and regular equipment and facility cleaning
- Emissions control
- Using energy-efficient equipments
- Workers awareness

What main **benefits** are involved when sustainable management practices are applied ?



What are the main **damages** that can result from sustainable management practices not being applied ?

- Soils are usually kept bare from herbaceous cover by combining herbicides and tillage, resulting in negative impacts on **runoff and soil erosion**, and in poorer biodiversity and soil fertility.
- Natural elements providing diversity and **complexity at a landscape** scale (patches of natural or semi-natural Mediterranean woodland and shrubland, hedges and crops such as cereals under rotation) disappear, hampering landscape multi-functionality.
- Several **negative externalities** arise that negatively **impact society**:
  - Health of local communities impacted by **pesticides in drinking water.**
  - Rural **infrastructures damages** caused by intense soil erosion.
  - Intensification of **global warming** since bare soils act as a mirror reflecting solar radiation.

the CHALLENGES

- Reduction of soil loss
- Increased organic matter and soil fertility
- Improved nutrient retention
- Increased carbon sequestration
- Increased biological control of pests and diseases
- Leading to stable and quality productions
- Boosting oleotourism

the SUSTAINABLE TECHNOLOGICAL SOLUTIONS

- Natural or seeded cover crops
- Sources of organic matter (e.g. composted olive mil pomace)
- Rational pruning
- Shredded pruning remains
- Livestock
- Irrigation efficiency

Some considerations for designing material and activities for capacity building of olive farmers

DESIGN

- Use of accessible language, avoiding technicalities
- Predominance of graphic resources over text
- Clearly highlight key ideas and concepts
- Take care of the format so that it is attractive and not dissuasive

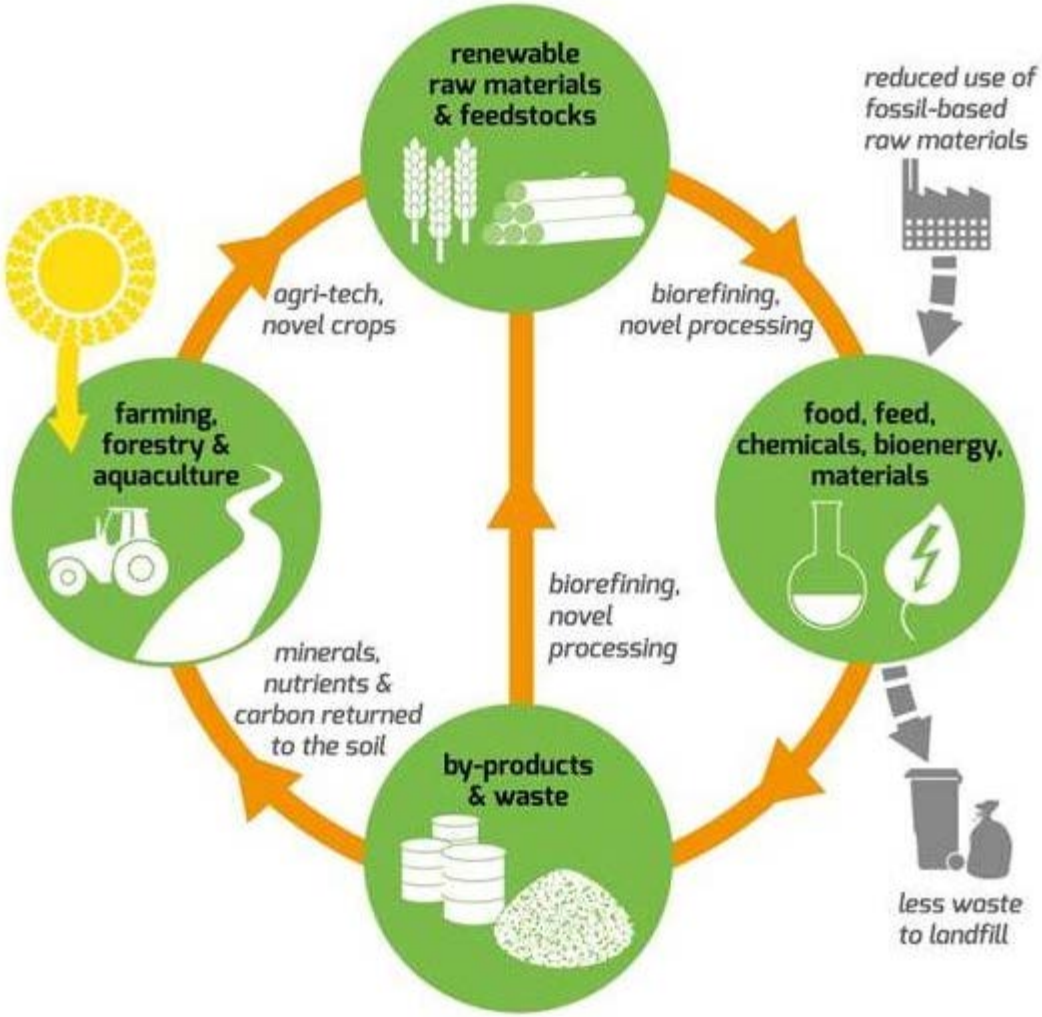
CONTENTS

- Summarize ideas and concepts
- Do not abuse melancholic and bucolic graphic and audiovisual elements
- Avoid any word that may lead to confusion
- Avoid controversial topics if we are not prepared to successfully defend them
- Give priority to information pills on long and dense documents
- Use of optimistic messages, never being alarmist

METHODOLOGY

- Know the details of the local reality and translate it into the designed materials or the planned actions
- Encourage participation
- Practice body language (non-verbal communication) that transmits confidence and security
- Use of close examples that are familiar to the olive farmer, if possible from the local level
- Collaborate with local olive farmers who have successfully implemented sustainable technological solutions
- Make the olive farmer feel like the protagonist in the process of change
- Put the economic benefit at the center of the debate
- Use technologies and communication channels that are easy to access and manage by the olive farmer
- Empathize with the olive farmer and practice active listening

How to integrate olive farming into a circular economy-based model. Some considerations



Picture credit: https://blog.bioplat.org

- Progressively **replacement of fossil-based fuels** by others based on renewable energies.
- Application of the principles of **the cradle-to-grave philosophy**.
- **Replace the monoculture model** by a complex agroecosystem with crop diversification which will not only improve its resilience but also its profitability.
- **Use of local resources** that involve the shortest possible route from the provider (0 kilometer policies).
- **Apply the elementary concepts of agroecology** to self-produce the necessary inputs for the olive grove, ceasing to depend on external ones.
- **Reduction in waste** from primary olive oil extraction.
- **Reduction of olive mill pomaces humidity** after separation which will lower carbon dioxide emissions during road transport to secondary extraction factories and drying of pomaces. Also it will lead to fewer toxic particles emitted to air by the secondary extraction facilities.
- Developing protocols for the **low-cost production of new by-products** such as high-value animal feed and bio-stimulants for plants.

Some key questions that responsible consumers should ask themselves before buying olive oil

Is it intensively produced?

Intensive olive plantations promotes **desertification**, use **high levels of pesticides** and demand huge **quantities of water**, often in regions where water is scarce. **Opt for environmentally friendly labels** to know that the olives have been grown sustainably.

Is it grown using pesticides?

Synthetic pesticides and herbicides **threaten insect populations**, **contaminate water sources** and can have ecosystem-wide knock-on effects. **Look for organic certification** to avoid ingredients grown with these chemicals, and to support sustainable farming practices.

Is it packaged in plastic?

It is advisable to **buy glass packaging and recycling** after use.

Is it a product from a small family company that supports the local economy?

It is foreseeable that a large company that simply acts as an intermediary between the farmer and the consumer has no interest in improving the socio-environmental conditions of the local producing communities. Choose **small brands that care about their territory**.