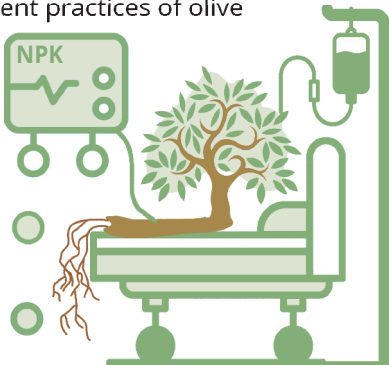




## OLIVE TREES IN THE ICU

Similarly to a patient in the Intensive Case Unit (ICU) of a hospital depending on a specific supply of food and medicines, many of the Mediterranean olive groves are productive only due to the supply of agro-chemical inputs.

Sustainable management practices of olive groves help deliver multiple ecosystem services related to the improvement of soil fertility and resilience against eventual diseases and pests.



## A PRIORITY OBJECTIVE

In agriculture, SOIL FERTILITY involves the capability of a soil to develop a crop, generating sustained and high quality yields.

The fertility of an agricultural soil depends upon:

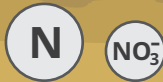
- ✓ Its ability to supply water and nutrients
- ✓ The absence of toxic substances that inhibit plant growth
- ✓ Its depth and structure
- ✓ Its internal drainage
- ✓ The amount of organic matter on its surface
- ✓ Its pH (best between 5.5 and 7.0)
- ✓ The abundance and diversity of microorganisms

Strengthening all these elements should be a priority for any farmer.

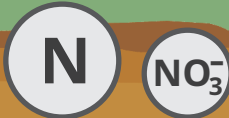
## DID YOU KNOW THAT...

both **total nitrogen** content and its assimilable fraction in the form of **nitrates** can be **doubled** in a soil when the percentage of **organic matter** is **raised from 1 to 2.5%** ?

1% organic matter



2.5% organic matter



## use of resources

# SOIL FERTILITY



## THE RESULTS OF SUSTAINOLIVE

SUSTAINOLIVE.EU

## A COMPREHENSIVE INDEX

### POSITIVE VARIABLES

#### NUTRIENTS

**PHOSPHORUS (P)**  
available in the soil (mg/kg)

**POTASSIUM (K)**  
exchangeable in the soil (mg/kg)

**CALCIUM (CA)**  
exchangeable in the soil (mg/kg)

**MAGNESIUM (MG)**  
exchangeable in the soil (mg/kg)

extra info

#### MICRO-ORGANISMS

**BASAL RESPIRATION (BR)**  
of soil microorganisms (µg C in the form of CO<sub>2</sub>/g and day)

**ENZYMATIC ACTIVITY (EA)**  
in the soil calculated as the geometric mean value of the main microbial activities

extra info

#### NITROGEN CYCLE

**ORGANIC NITROGEN (N)**  
available in the soil (g/100g soil)

**NITRATES (NT)**  
in the soil (µg N in the form of nitrates/g soil)

**NITRIFICATION POTENTIAL (NP)**  
of the soil (µg N produced in 5 hours/g soil)

extra info

#### PHYSICO-CHEMICAL PROPERTIES

**ORGANIC MATTER (OM)**  
which can be turned into humus (g/100g soil)

**FIELD CAPACITY (FC)**  
of the soil (g water/100g dry soil)

extra info

**PERMEABILITY (PE)**  
of the soil (mm/hour)

**CATION EXCHANGE CAPACITY (CE)**  
of the soil (meq/100g)

### NEGATIVE VARIABLES

**SODIUM (NA)**  
exchangeable in the soil (mg/kg)

**GRAVEL (G)**  
in the soil (%)

**EROSION (E)**  
of the soil (tons per hectare and year)

- STEP 1:** Measure the positive and negative variables of two (or more) soils whose fertility you aim to compare.
- STEP 2:** For each variable, assign an index of 1 to that soil with the highest values. The remaining soils will be assigned values proportional to the reference value of 1. For example, if two soils have 15 and 25 mg P/kg, they will be respectively assigned values of 0.6 (to the former) and 1 (to the latter). Relative indices for positive variables to be calculated this way will be assigned positive values, and the contrary for negative variables.
- STEP 3:** Add all relative indices and divide the result by the total number of variables (16 in this case). The resulting index (FI) ranges between 0 (sterile soils) and 0.8 (soils with optimal fertility rates). From this point, direct comparisons can be made amongst the fertility of different soils.

$$FI = [\text{Relative indices (P+K+CA+MG+N+NT+NP+BR+EA+OM+FC+PE+CE)} - \text{Relative indices (NA+G+E)}] / 16$$

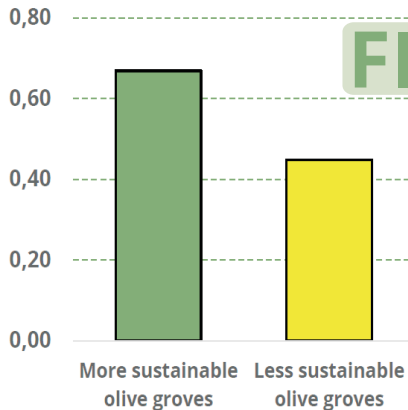
### ONE REMARK

The FI index is a relative indicator that has not been designed to determine the fertility of a soil individually. It is only useful to compare the fertility of two or more soils amongst themselves.

## THE CASE OF SUSTAINOLIVE

Type	POSITIVE														NEGATIVE		
Variables	P	K	CA	MG	N	NT	NP	RB	EA	OM	FC	PE	CE	NA	G	E	
More sustainable olive groves	16,3	375,4	4385,7	181,6	0,1	10,7	22711,5	39,5	140,0	2,4	37,4	3,2	26,6	98,8	18,5	4,4	
Less sustainable olive groves	19,0	268,8	4485,7	183,2	0,1	10,4	12557,9	18,6	65,1	1,5	40,4	1,5	27,3	127,1	13,8	17,9	

RELATIVE INDICES																
More sustainable olive groves	0,86	1	0,98	0,99	1	1	1	1	1	1	0,93	1	0,97	-0,78	-1	-0,24
Less sustainable olive groves	1	0,72	1	1	0,65	0,97	0,55	0,47	0,46	0,63	1	0,46	1	-1	-0,75	-1



## KEEP IN MIND THAT...

various olive grove management practices exist that are known to increase soil fertility:

- ✓ Maintenance of cover crops and plants that diversify landscape structure (hedgerows, patches of native vegetation, intercropping, etc.)
- ✓ Contribution of sources of organic matter (shredded pruning waste, manure, composted olive mill pomaces, clearing of herbaceous cover, etc.)
- ✓ Minimization or complete removal of soil tillage practices
- ✓ Significant reduction or elimination of the use of herbicides and insecticides

