Valorising Sweet Acorn

radiant PROJECT

UNIVERSIDADE CATÓLICA PORTUGUESA

Agroecological Production of Sweet Acorn

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Acorns: the valorization of trees from the native forests

The Acorn is the most abundant fruit in temperate regions of the northern Hemisphere, though its consumption by humans is residual. Oaks are trees and shrubs from the genus Quercus, also being a keystone species, with huge ecological influence on its natural environment. In Portugal, evergreen Holm oaks (*Quercus rotundifolia*) and Cork oaks (*Quercus suber*), create the Montado agroforestry-system representing vast areas of ecologically high value, semi-natural habitats.

Bad management practices and the growing land use alternatives (such as solar farms), are competing the Montado itself. To consider Acorns as a resource for direct human consumption would add value to these trees, and the native forest itself. Moreover, acorn's nutritional profile and the abundance, could contribute to food sovereignty based on a sustainable and super nutritious fruit.

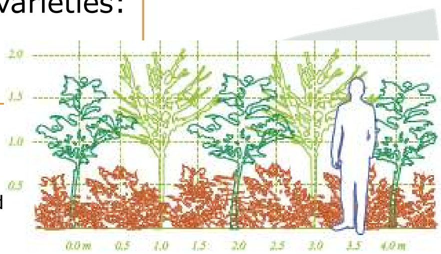
RADIANT Orchards

2 Orchards plots of Successional Agroforest

- Holm-Oak as a main species, and companion species, such as Tagasaste (*Cytisus proliferatus*) a nitrogen- fixing perennial plant, Mastic (*Pistacia lentiscus*), and Strawberry-tree (*Arbutus unedo*), as native habitat belonging species, supporting the natural succession and promoting biodiversity, both producing wild berries, and creating a stratified/ multilayered system.
- The agroecological practices implemented in the orchards were: i) minimal soil mobilization, ii) adding organic compost and iii) mulching with wood-ships, wooden logs and straw. Watering in the first summers provides for a more successful installation.
- The orchards shall develop as a semi-natural systems where fruit production is one in many functions and services being generated.

Selected varieties of Holm oaks

- 10 Spanish Holm oaks of especially sweet and productive varieties: grafted clones purchased from a tree nursery.
- 5 Freixo do Meio sweet and productive varieties: grafted clones on a small-scale experiment.
- total 148 plants in 2 plots.



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Results on Radiant Orchards

Plant survival rate

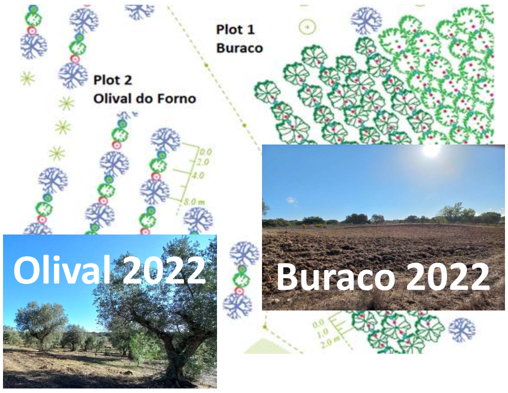
- Holm oaks (*Quercus rotundifolia*) - 68%
- Tagasaste (*Cytisus proliferatus*) 40%
- Mastic (*Pistacia lentiscus*) 54%
- Strawberry tree (*Arbutus unedo*) 37%

Grafting with Freixo do Meio varieties:

- Low success
- Need to improve the grafts and mother trees selection

Evolution of Soil Physical and Chemical properties

Parameter	Unit	Buraco 2022	Buraco 2024	Olival Forno 2022	Olival Forno 2024
pH		6,0	6,1	6,8	6,8
EC	µS/cm	0,1	0,04	0,1	0,04
SOM	(%)	1,4	1,9	2,7	2,5
C		0,8	1,1	2,5	1,5
N		0,1	0,02	0,1	0,1
P	mg/kg	76,6	57,6	73,2	43,1
K		198,0	116,0	274,0	71,0
Ca		4223,4	1695,0	3652,2	1950,0
Mg		2168,0	400,0	484,0	210,0
B		11,4	1,7	12,2	2,0
Fe		68,4	108,5	77,4	56,0
Zn		0,6	0,4	1,8	1,5
Mn		69,6	56,5	114,1	74,5
Cu		<0,01	0,2	4,2	2,5
C/N		13,3	55,25	26,1	15,53



Evolution of Soil Microbiology

Parameter	Unit	Buraco 2022	Buraco 2024	Olival Forno 2022	Olival Forno 2024
Microbial respiration	mg CO2.Kg-2 soil.d-1	8,3	10,0	16,7	57,3
Dehydrogenase		0,2	0,5	1,6	1,8
Arylsulfatase		6,67	14,7	19	32
β-glucosidase		2,33	116,3	123	288,7
Fosfatase		259	434,7	321	371,7
Bactérias		5,32E+06	1,02E+07	6,99E+06	1,52E+07
Fungos		7,82E+05	4,19E+05	7,38E+05	3,37E+05
F/B		1,47E-01	4,10E-02	9,47E+00	4,52E+01

Conclusions

- Plant survival and plant vitality are considered good in all orchards;
- Mulching, being the only component added to the soil, helped considerably to sustain soil fertility in adequate levels in both plots. While macro-elements maintained acceptable levels, micro-nutrients would need to be tunned when a bigger fruit production is aimed;
- The increase of soil microbiology is more notable in the initially poorer plot of Buraco than in Olival, but both sites evolve considerably. All indicators express a consistently increase on microorganisms' activity meaning a healthy tendency of soil evolution.

Acorn Academy

Freixo do Meio follows a line of thought based on sharing knowledge and motivating the consume of Acorns. A scientific/practical Symposium joined 30 people in Novembre 2024 and an Acorn-Academy event is being launched. The selling strategy is now focused on three main products: Acorn Flour (fine and coarse), Acorn Infusion/Coffee, and dried Acorn nuts. Since 2024, Freixo do Meio improved technological procedures, in order to increase the process efficiency and, eventually, decrease product prices.

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II Symposium Bolota: para consumo humano 15 Nov