

CARVIÇAIS · TORRE DE MONCORVO · DOURO SUPERIOR

Pistachio Project

Pistachio planting in Carviçais, Torre de Moncorvo — land characterisation, technical concept and economic model.

LAND ASSEMBLED	TARGET PRODUCTIVE AREA	THEORETICAL TREES	ESTABLISHMENT CAPEX
49.96 ha	40 ha	~11,111	418.2 k€

Territory and location

An Iberian inland farming context, with a tradition of permanent crops and a contrasted climate.



The three parcels assembled, to scale and in relative position. Parcel III lies some 6 km from the other two.

PARCEL	AREA (HA)	ELEVATION (M)	SLOPE
I — Terreno da pista	11.76 ha	468 m	32 %
II — Sul	18.11 ha	380 m	38 %
III — Nascente	20.09 ha	418 m	43 %
Total	49.96 ha		

Slope and mechanisation

The measured slopes are substantial: harvesting with a trunk shaker calls for ground below 20 to 25 % incline, and all three parcels average above that. That is why the steeper zones are terraced — see the technical concept. The stratification above decides where to terrace and where to use ground that is already flat: 18.5 ha sit below 25 % incline and can be planted without earthworks; the remaining 31.6 ha need terracing.

Climate, ten years of record

Daily temperatures from the ERA5-Land reanalysis at the centre of each parcel, from 2016 to 2025, adjusted to the elevation the terrain model gives the land. This is the record that was missing to answer the two questions that decide the crop: whether winter chill accumulates and whether late frost threatens flowering.

PARCEL	WINTER			SPRING			SUMMER			AUTUMN		
	LOWS	MEAN	HIGHS	LOWS	MEAN	HIGHS	LOWS	MEAN	HIGHS	LOWS	MEAN	HIGHS
I — Terreno da pista	3.2	7.1	11.5	7.6	13.0	18.4	16.5	23.2	29.7	10.6	15.4	20.5
II — Sul	3.8	7.6	12.1	8.2	13.6	19.0	17.1	23.8	30.3	11.2	16.0	21.0
III — Nascente	3.6	7.4	11.8	8.0	13.4	18.8	17.1	23.7	30.3	11.0	15.7	20.7

Decade average for each season, in degrees. The middle column is the mean of daily temperatures; the others average the highs and the lows.

I — Terreno da pista Chill hours: 1,159 h (weakest year 874 h) Growing degree days: 1,998 Late frosts: 2 / 10	II — Sul Chill hours: 1,137 h (weakest year 880 h) Growing degree days: 2,118 Late frosts: 2 / 10	III — Nascente Chill hours: 1,168 h (weakest year 869 h) Growing degree days: 2,094 Late frosts: 2 / 10
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Winter chill requirement of Kerman, the dominant cultivar: 800 h

Winter chill arrives, with room to spare

The three parcels accumulate between 1,137 and 1,168 chill hours per winter, against the roughly 800 Kerman requires to break bud reliably. Even the weakest winter of the decade stayed above that requirement on all three, at 869 to 880 hours. This is the requirement that most often rules pistachio out in the southern Iberian Peninsula, and here it is settled.

Late frosts all fell before flowering

Frost after 15 March occurred in 2 of the ten years, and always during March. None in April, which is when pistachio flowers at this latitude. The risk is real and should not be dismissed, but ten years of record show no episode catching open flower.

Soil and water

Soil profile from SoilGrids and a water balance computed over the same ten years as the temperature record. It replaces neither laboratory analysis nor a measured flow rate, but it says enough to steer rootstock choice, ground correction and irrigation sizing.

PARCEL	PH	TEXTURE	STONES	CEC	AVAILABLE WATER RESERVE
I — Terreno da pista	5.7	franco-arenoso	32 %	19.1	70 mm
II — Sul	5.7	franco-arenoso	32 %	18.3	70 mm
III — Nascente	5.7	franco-arenoso	32 %	18.0	71 mm

What the water source has to deliver

STRATEGY	PER HECTARE	ACROSS THE ORCHARD	PEAK FLOW
Full comfort — 100 % of ETc	7,048 m³	281,920 m³	147 m³/h
Controlled deficit — 60 %	4,229 m³	169,160 m³	88 m³/h
Support irrigation — 35 %	2,467 m³	98,680 m³	52 m³/h

The soil is acidic, not calcareous

pH sits around 5.7 throughout the profile, and pistachio prefers 7.0 to 7.8. The usual conversation about this crop turns on tolerance of lime; here the problem is the reverse. It calls for liming before planting, and it changes the rootstock criterion: no longer resistance to chlorosis, but vigour in poor, acidic ground.

Drains well, holds little

Loam to sandy loam over schist, with roughly a third of the volume taken by stones. Drainage is excellent, and that matters because pistachio dies of root asphyxia long before it dies of drought. The trade-off is storage: barely over 70 mm, of which 35 are usable between waterings.

Preliminary technical concept

A design intended for professional, mechanisable and digitally managed farming. Final parameters must be validated by a specialist.

TARGET PRODUCTIVE AREA	REFERENCE SPACING	ESTIMATED DENSITY	THEORETICAL TREES
40 ha	6 × 6 m	278 trees/ha	~11,111

Variety mix

CULTIVAR	ROLE	TREES	SHARE
Kerman	Producing	7,000	62.9%
Peter	Pollinator	784	7.1%
Sirora	Producing	3,000	27.0%
C-Especial	Pollinator	336	3.0%
Total		11,120	100 %

Terracing

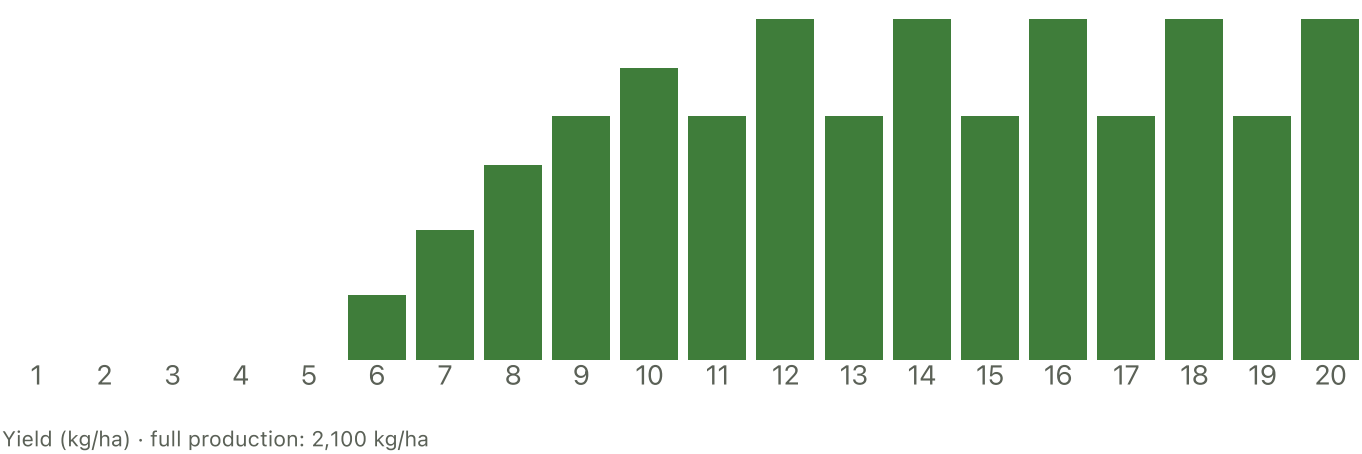
On the steeper ground the land is terraced, with level platforms carrying the planting rows. It is the Douro's traditional answer to farming a hillside, and it settles irrigation, soil and mechanisation in one move.

Production system

The orchard starts under Integrated Production. Conversion to organic stays open, to be decided with the investor in light of how the orchard behaves and what the market pays — and the crop calendar leaves time for that decision to rest on data rather than intent.

Production and revenue

Production ramps up from year 6 and, from year 11, alternates between on-years and off-years.



YEAR	YIELD (KG/HA)	TOTAL PRODUCTION (KG)	REVENUE (€)
5	0 kg/ha	0 kg	€0
7	800 kg/ha	32,000 kg	160.0 k€
9	1,500 kg/ha	60,000 kg	300.0 k€
10	1,800 kg/ha	72,000 kg	360.0 k€
12	2,100 kg/ha	84,000 kg	420.0 k€
15	1,500 kg/ha	60,000 kg	300.0 k€
20	2,100 kg/ha	84,000 kg	420.0 k€

The curve follows the pistachio schedule in the Portuguese CAP technical guidance for a density of 286 trees/ha — the closest to the 6 × 6 m spacing adopted, which gives 278: from 400 to 1,500 kg/ha in years 6 to 9, and a mature level of 1,800 kg/ha. From year 11 output alternates around that level, even years heavy and odd years light, so that the average across the twenty full-production years remains exactly the 1,800 kg/ha of the reference. Alternate bearing redistributes the crop; it does not shrink it.

Investment and costs

Establishment capital is concentrated in planting material, land preparation and the water system.

CATEGORY	BUDGET (€)	% OF TOTAL	BASIS
Soil, water, topography studies and agronomic design	€1,000	0.2%	Estimate
Land preparation and base soil correction	€130,000	31.1%	Estimate
Grafted plants, stakes and fixings	€129,236	30.9%	Quoted
GPS layout and planting	€16,000	3.8%	Estimate
Irrigation and fertigation network	€35,000	8.4%	Estimate
Abstraction, reservoir and pumping	€36,000	8.6%	Estimate
Fencing and internal access tracks	€15,000	3.6%	Estimate
Electrification, solar and switchboards	€25,000	6.0%	Estimate
Weather station and sensors	€1,000	0.2%	Estimate
Engineering, design and permits	€10,000	2.4%	Estimate
Contingency	€20,000	4.8%	Estimate
Total	€418,236	100 %	

Operating costs

YEAR	SERVICES	INPUTS	WATER AND ENERGY	INSURANCE	TOTAL
From year 1	450	200	130	20	800
From year 6	620	280	220	80	1,200
From year 15	780	350	260	110	1,500
From year 25	940	420	310	130	1,800

Line items in euros per hectare. The last column is the total annual cost across the orchard.

Financing structure

Sources and uses of capital under the two modelled scenarios.

USES — CAPITAL REQUIREMENT	AMOUNT
Base economic CAPEX	€418,236
Operations, first 5 years	€240,000
Development and additional studies	€5,000
Working capital reserve	€30,000
Total	€693,236

Investor economics

SCENARIO	CAPITAL INVESTED	IRR	MOIC
Scenario A — with PEPAC	€450,000	9.65%	4.14×
Scenario B — without PEPAC	€650,000	6.94%	2.86×



Cumulative investor cash flow in the PEPAC scenario, from year 0 to year 20.

Data sources

Everything this site presents comes from one of these origins. Where there is measurement, the source, resolution and period are named; where there is estimation, it is said to be an estimate.

DATA	SOURCE	RESOLUTION AND PERIOD
Sentinel-2 L2A	Copernicus · ESA, via Copernicus Data Space Ecosystem	10 m · composto de verão
Copernicus DEM GLO-30	Copernicus · ESA, via Copernicus Data Space Ecosystem	30 m
Reanálise ERA5-Land	ECMWF, através do arquivo histórico da Open-Meteo	≈ 11 km, corrigida para a altitude do ponto · 2016–2025
Reanálise ERA5	ECMWF, através do arquivo histórico da Open-Meteo	≈ 28 km · 2016–2025
SoilGrids 2.0	ISRIC — World Soil Information	250 m
Orientação Técnica AG PEPACC/OT n.º 27/C.2.1.1/2025	PEPAC — Plano Estratégico da PAC	variante de 286 plantas/ha
Proposta de fornecedor	documento não publicado	2026
Informação dos promotores	levantamento próprio	—
Ortofoto e medições de área	Google Earth	—
Cartografia base	OpenStreetMap	—

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Presentation document. It constitutes neither an investment recommendation nor a formal valuation. Figures derive from the project model and the data sources listed.