



## **Agri/Viticultural Solar Project at the Domaine de Nidolères (Roussillon)**

### **The Domaine de Nidolères**

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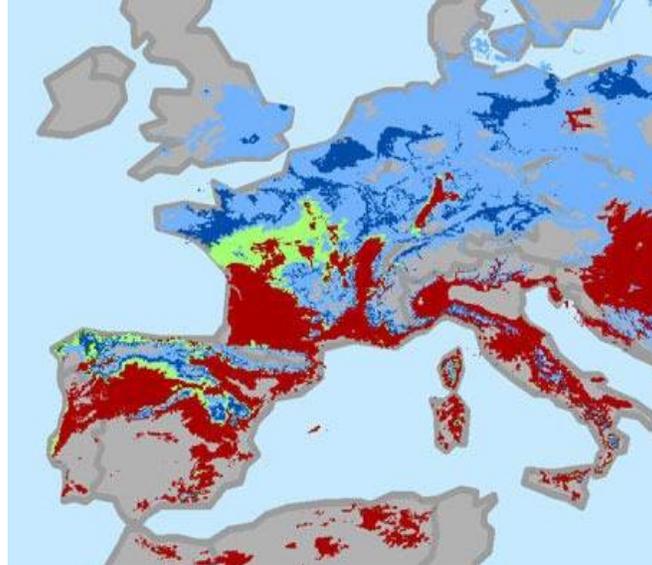
- is a family estate
- of 60 ha/150 acres under sole ownership
- cultivated in vineyards for eight generations
- that has been involved in wine tourism for over ten years with its Catalan restaurant, accommodations and bed and breakfast
- is located in the Aspres region (in the heart of the Roussillon), in the commune of Tresserre
- is planted to traditional Mediterranean varieties (Syrah, Grenche, Mourvèdre, Carignan, Cinsault, and Muscat of Alexandria)
- its production is based on AOPs (Côtes du Roussillon Rouges, Rivesaltes Ambré and Tuilés, Muscat de Rivesaltes) and IGPs (Côtes Catalanes and IGP d'Oc)
- as is generally true of the Roussillon, yields are low (from 30 to 45 hl/ha)
- the estate's wines are sold in bulk (70%) and in bottle (30%), in part through wine tourism and in part via export (15% of the production in the United States, Czech Republic, Belgium and Spain)

### **A Project That is Unique in the World: The Stakes**

It is clear that the agricultural world, and particularly the Mediterranean vineyards, are and will continue in the future to be increasingly impacted by climate change. It is imperative to investigate from today forward adaptations that can be made in the face of excessive temperatures that are already affecting production!

**Map of the Mediterranean Vineyards Projected Forward to 2050:**

- viability threatened
- sustained vineyards
- promising new zones



Is solar agriculture a path of growth to follow for the vine?

### **The Principle**

Conducted by SUN'R and the INRA between 2009 and 2012, a similar program demonstrated an agri-solar synergy by comparing the growth of different crops under the shelter of solar panels, both fixed and in full exposure to the sun. The promising results are the following:

- a strong LER (Land Equivalent Ratio)
- water conservation (of up to 30%)
- a possible overall economic gain for high value added crops
- maintenance of agricultural yield under certain crop conditions and solar panel placement

This kind of program already exists in Japan with other kinds of agricultural production but has so far never been implemented for vines.

The Installation:

The undeveloped area classified for placement of the solar panel project will cover three parcels currently lying fallow, under the land register B420, B390 and B389.



In order to produce a homogenous, reliable, comparative and reproducible study, the plot is a single parcel in the heart of the estate covering roughly 7 ha 50/18.5 acres to be dedicated to this **solar viticultural project unique in the world**.

In partnership with SUN'R, the INRA and the Agricultural Chamber of the Pyrénées Orientales, the agri-solar development of these parcels will be carried out according to an experimental program that will be part of a perspective on sustainable development.

Moreover, this will eventually allow a closer response to an equation that is for the moment impossible to solve: that of the conflict between use of agricultural lands for energy or for food production.

On these 18.5 acres:

- 5 ha/12.5 acres will support a winegrape vineyard and solar panels
- 2 ha 50/6 acres will also be planted to serve as a control vineyard

To keep in mind:

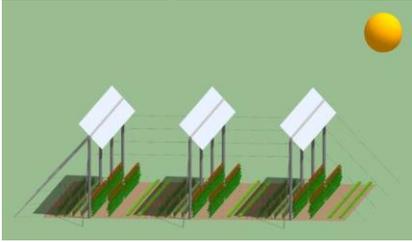
- These experimental parcels will be worked according to practices specific to wine production. The grower will cultivate according to the dictates of sustainable viticulture and following the advice and wishes of the partners, while the latter will manage the operation of the panels.
- The panels will be used exclusively in the vineyard and be in operation principally during the most active vegetation period (from the beginning of June to the end of August). The rest of the time they will produce electricity managed by SUN'R.
- Today still under study:
  - which varieties will be planted (certainly white vines of the AOP and IGP Roussillon)
  - what kind of trellising (certainly low)
  - spacing between the rows (certainly that most compatible to mechanization and the placement of the panels)

## The Desired Objectives:

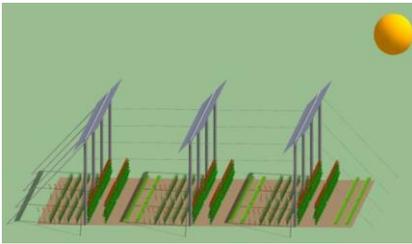
With the Sun'Agri2 process, the solar panels will be used as an "intelligent" regulator of the microclimatic parameters of the plant. They will be inclined differently, depending on the position of the sun, to respond to the needs of the vine.

Examples of situations:

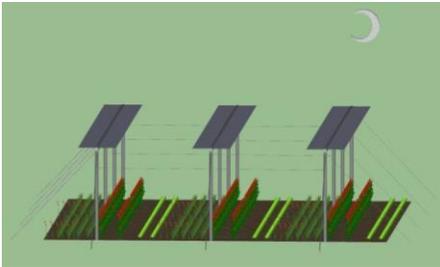
Situation 1: the plant must either be protected or when it has low need [for illumination]



Situation 2: the plant must be exposed



Situation 3: limitation to nocturnal cooling



The primary objectives are:

During a sunny period, the shade from the panels will:

- prevent the leaves from scorching, which will avoid:
  - blockage of photosynthesis and consequent ripening
  - and therefore a heterogeneous maturation of the cluster
- prevent scorching of the clusters:
  - which will maintain more aromas and aroma precursors; the quality of the wines will be enhanced
  - prevent dessication and consequently loss of harvest (volume)

- avoid excessively high concentrations of sugars, since ripeness is accelerated by overly strong exposure to sunlight that concentrates sugar through loss of water; this will lead to wines with more moderate alcohol content
- avoid excessive loss of acidity and maintain more freshness in the wines
- limit evaporative transpiration from the plant and indirectly loss of yield as well
- lead to a more progressive ripening to yield a better balanced must

Whether day or night, the panels will be able to act as:

- wind deflectors, creating a favorable microclimate:
  - for vegetative growth without breaks
  - for the proper nourishment of the berries
- protection against rain, reducing risks of development of mold, by limiting time of exposure to humidity of the leaves (oidium) and/or clusters (odium, botrytis)

The researchers hope moreover that once in operation, this project will give them new benefits or problems to resolve linked to the development conditions intrinsic to the vine.

### **Management of the Project, and Its Economic and Environmental Impacts**

The degree of inclination of the panels will be controlled via computer program from Lyon (SUN'R's location) in concert with the needs of the vines and with recommendation made on site by the INRA and the Agricultural Chamber of the Pyrénées Orientales.

Each panel can be individually activated by a motor.

This viti-solar project can be seen to be destined to become part of the dynamic growth of the regulation of production of the Mediterranean vineyards.

It will provide for maintenance and continuation of development of agricultural and viticultural regulation of the production of Mediterranean vineyards.

In any event, for the Domaine des Nidolières, this project:

- will moreover allow the construction of a new cellar to European standards with an air conditioned storage location essential to proper preservation of the wines produced
- a vitally important asset for its wine tourism
- will also allow it to position itself to attain level 3 of the "environmental certification: which requires regulatory adherence in matters of cultivation, respect of biodiversity criteria (wildlife refuge, shrublands, bands of grassland) and the restoration of a "casot," a traditional shelter found in the Roussillon vineyard
- will be completely integrated in the environment, surrounded by vines and woodlands and through the choice of panels (French) and their supports (driven wood stakes without use of concrete)

**The Partners:**

SUN'R  
Domaine de Nidolères  
Optimum Tracker

INRA  
Tressere  
Irstea

Chambre d'Agriculture Roussillon  
Photowatt  
Institut National de l'Energie Solaire

**For more information on Roussillon:** [www.winesofroussillon.com](http://www.winesofroussillon.com)

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