# FOTOPONICA Project

#### GROWTH OF MEDICINAL AND AGRICULTURAL FOOD PLANTS ABOVE GROUND











- It plans to create protocols and production systems that allow the accelerated and controlled growth of plants for agri-food and medicinal use, soilless.

- Follows and evolves already known systems such as hydroponics, aquaponics and aeroponics

- It is carried out in a closed environment, where the optimal environmental conditions necessary for the growth of plants are reproduced, such as light, temperature, humidity, nutrients, etc etc.

-The system is controlled and monitored remotely, by a sophisticated software designed by us.



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### THE ISSUES OF THE PLANET

#### FOOD REQUIREMENTS

By the end of the century, 80% more food will be needed to feed the world's population. Double the current one. There are countries that do not have the environmental conditions to produce basic necessities and are forced to import them with huge shipping costs and consequent air pollution, whether it is done on wheels. air or ship! Countries that do not have the culture to produce food products, let alone medicinal products

#### WATER SCARCITY

Worldwide, more than 4 billion people live with the problem of water Water shortages are one of the most dangerous challenges facing the world and are far worse than previously expected Crops need immense quantities of water, periodic and not scarce or disastrously occasional as there are today.



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# THE ISSUES OF THE PLANET

#### **CLIMATE CHANGE**

The global climate emergency has spiralled out of control, with predictions indicating an average temperature increase of 3 degrees by 2050. This rise could lead to catastrophic consequences for conventional agriculture, potentially worse than what we have already experienced. The most critical impact is the resultant scarcity of products, the disproportionate surge in prices affecting consumers, and the significant financial burden on governments as they compensate farmers who have encountered environmental disasters.

#### LAND AND WATER POLLUTION

Pollutants emitted from industrial activities, transportation (whether by road or air), and other economic sectors are absorbed by the soil, affecting the roots of crops and resulting in harmful pollution that can persist for years. Acid rain, formed from the release of sulphur dioxide (SO2) and nitrogen oxides (NOx) into the atmosphere, reacts with moisture and converts into acids. Consequently, when this water precipitates as rain, snow, or hail, it becomes acidic, leading to the acidification of lakes and streams, which are vital sources for irrigating agricultural lands.



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### THE ISSUES OF THE PLANET

#### **ECO-SUSTAINABILITY**

This concept will necessarily have to be applied to the different areas of our lives.

Starting with what we eat, how we produce it, how we take care of ourselves and how we behave on a daily basis.

Every day we have to make choices that, although small, go in the right direction for the protection of the environment.

Preserving it is everyone's duty.





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### LA SOLUZIONE

### POSSIBLE SOLUTIONS WITH FOTOPONICA







Using our system it is possible to have nutrients under control, save up to 80% of the water that is used in traditional irrigation on the ground, cultivate in protected and very small environments and have several harvests a year with a single cutting or bulb

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#### Product Quality Control

The product is pesticide-free and highly organic, the crops are grown indoors and in a controlled environment, where there is very low contamination by insects, parasites, bacteria and viruses. It is also free of microtoxins, fungi, mold and heavy metals.

#### Increase or Create New Productions

The cultivation is not subject to damage caused by climate change, such as frost, hail or unseasonal storms, it is not subject to the seasonality of the plant.

It is possible to create new production plants all over the world with regional peculiarities of our country.



THE PROTOCOL

### THE CULTIVATION PLANT

# ARTIFICIAL LIGHT

# THE SOFWARE

#### THE ACCELERATION OF GROWTH

Here





The protocols outline the essential parameters of light, water, and minerals required for the growth and/or expedited flowering of the different plant species studied. The alteration of the photoperiod, and thus the enhancement of growth, consistently stays within the physiological limits of the plant, which now adheres to an artificial light cycle rather than the natural solar cycle.



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**THE CULTIVATION PLANT** 

Soil has transitioned from being an active component of the production system to being supplanted by inert substrates or artificial supports that serve similar purposes. Recently, the agricultural sector has increasingly discussed soilless techniques, commonly known as "hydroponics/aeroponics/aquaponics." These methods emerge from a profound understanding of plant physiology, the implementation of cutting-edge irrigation systems, and the careful management of climatic conditions within a controlled environment.



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Artificial light is determined by a system of emitters that provide different wavelengths and different degrees of energy intensity, which are specifically calibrated for each type of plant.

It is feedback from a series of sensors that verify the growth trend based on the spectrum of the color of the leaves, the absorption of minerals and the amount of water, as well as the size of the plant itself.



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#### THE SOFTWARE

The system enables you to establish and maintain consistent environmental conditions, including temperature, atmospheric pressure, humidity, air flow, and oxygen levels. It automatically regulates irrigation, feeding, and lighting phases according to a pre-defined protocol tailored for each tank. The system connects with advanced plant sensors to monitor various parameters, such as the weight of individual plants, leaf color spectrum, air quality, CO2 levels, and it analyzes the water obtained from tank cleaning processes. Accessible via cloud management, the software provides functionalities to:

Ensure the systems are operating correctly;

Receive alerts in the event of any anomalies or malfunctions;

•Precisely schedule environmental parameters over time, set irrigation timings, and define lighting and rest cycles for each cultivation tank. Additionally, the system features a camera setup that captures the grow area in time-lapse, which can be viewed remotely, along with an audio broadcasting system for conducting experiments on the effects of sound waves in cultivation.

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# **ACCELERATING GROWTH**

The acceleration of growth is given, in large part, by the variation of the photoperiod, to which must be added a correct supply of minerals and water.

The photoperiod, however, always remains within the physiological capacity of the plant, which no longer follows the solar cycle but the artificial one.



# THE SOLUTION

#### THE ADVANTAGES

Your Logo or Name Here



### **THE ADVANTAGES**

The careful management of minerals, nutrients, environmental factors, and water supplied to crops facilitates the creation of a final product with unique characteristics:

The product is organic and free from pesticides, as it is grown in greenhouses or indoor environments that ensure controlled conditions, greatly reducing the risk of contamination from insects, parasites, bacteria, and viruses;

It is also free of microtoxins, as controlled growth environments significantly restrict the growth of fungi and molds such as Aspergillus, Penicillium, and Fusarium, which are known to generate microtoxins.

Furthermore, the product contains no heavy metals, including lead, cadmium, manganese, aluminum, and mercury, because the essential minerals for plant growth are provided through the culture water instead of being taken up from the soil.





# **ADDITIONAL BENEFITS**

Elimination of polluting farming equipment.

- No reliance associated with climate change risks.
- Production not affected by the seasonality of the crop.
- Water consumption at or below 20% of that used for conventional farming.

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### The eco-sustainability of the project

The system is designed to be eco-friendly, as:

The electricity required to operate the lamps and electrical devices will be generated by a photovoltaic system.

Additionally, a biomass generator will supply heat, utilizing organic waste produced from the crops themselves.



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Michele Antonini expert in computer science, programming and business organization.

Giuseppe Laghezza Masci, Administrator, expert in marketing, commercial organization and internationalization

The technological skills of Engineer Luciano Cudicio. Project Creator

The support of the agronomists Dr. Federico Monteleone and Dr. Riccardo Tartaglia

The world of university research (Univ. Della Tuscia and Univ. Di Siena) represented by the biologist: Drsa Valentina Laghezza Masci.

The managerial and administrative skills of Dr Carlo Ferdinando de Nardis.



Michele Antonini

Business Organization and

Computer Programmer



Luciano Cudicio

Electronic Engineer

Giuseppe Laghezza Masci

Amministrator and

commercial





 Valentina Laghezza Masci
 Federico Monteleone

 Bioòlogist
 Agronomist



Agronomist



Carlo Ferdinando De Nardisi Finance





#### **FOTOPONICA Sris**

Legal/Administrative Headquarters and Research Laboratory:

Strada Statale 17 Loc. Boschetto di Pile c/o Tecnopolo d'Abruzzo67100 L'Aquila

Partita IVA e C.F. 02163520667 Mobile +39 3933859295