



**Beghelli**  
**fiore**®

**HORTICULTURAL  
SOLUTIONS**

# Sustainability and innovation.

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EVERY PLANT SPECIES  
HAS SPECIFIC NEEDS:  
WE UNDERSTAND THEM  
AND PROVIDE YOU WITH

**THE RIGHT  
SOLUTION.**

WE PRODUCE LAMPS AND LED MODULES FOR HORTICULTURE: TECHNOLOGICALLY ADVANCED, THEY ARE DESIGNED TO HELP GROWERS INCREASE HARVEST VOLUMES, CREATE VALUE BY IMPROVING THE NUTRACEUTICAL PROPERTIES OF THE PLANT, EXTEND THE SUMMER CROP GROWING SEASON AND ENSURE PRODUCTION EVEN IN WINTER.

# What sort of plants do you want to grow?

## THE RIGHT LIGHT WHATEVER THE GROWING SETUP

We started building our lighting know-how over twenty years ago, when we began developing electronic applications with a specific focus on the LED technology that has, for many years now, been changing the way light is designed, opening up new horizons also in the area of cultivation.



### INTENSIVE CROPS

Production of Solanaceae (tomato, aubergine) and Cucurbitaceae (cucumber, melon) uninterrupted and guaranteed for 365 days a year, using customized light spectra according to crops. Produce shelf life is increased and greater plant compactness reduces manpower requirements.

#### GROWING

- GREENHOUSE
- VERTICAL FARM

#### SPECTRA

- Hortis spectrum
- Fruits spectrum (intra canopy)
- Extended White spectrum "Come il Sole" ("Like the sun")

#### LAMPS

- Interlight lamp
- Toplight Plus lamp



### ALGAE

Growing algae suitable for human consumption such as spirulina and chlorella, marketed as fresh or freeze-dried products, is a business not linked to a specific production season and highly appreciated by the food supplement industry. LED lamps speed up algal growth ensuring earlier harvests and at the same time, products rich in antioxidants.

#### GROWING

- GREENHOUSE
- VERTICAL FARM

#### SPECTRA

- Purple EVO spectrum
- Custom spectra

#### LAMPS

- Penta-Circular lamp
- Toplight Plus lamp



### SMALL FRUITS

Raspberries, strawberries, blackberries and blueberries are typically summer crops that require special care and lots of light. Thanks to LED lamps fruit growth can be regulated to obtain higher yields as well as firmer fruits, with brighter coloring which consequently are better sellers.

#### GROWING

- GREENHOUSE
- VERTICAL FARM

#### SPECTRA

- Fruits spectrum

#### LAMPS

- Interlight lamp
- Toplight Plus lamp
- Circular lamp



### MUSHROOMS

Mushrooms include several very popular varieties, such as pleurotus or champignon (button mushrooms). With **BEGHELLI FIORE**, it is possible to achieve improved product characteristics, such as better size and shorter waiting time between one harvest and the next.

#### GROWING

- GREENHOUSE
- VERTICAL FARM

#### SPECTRA

- Mushroom spectrum

#### LAMPS

- Slim lamp
- Circular lamp



## ORNAMENTAL PLANTS

Roses, gerberas, chrysanthemums, tulips, peonies and daffodils are just some of the floricultural products that can be very successfully grown thanks to **BEGHELLI FIORE** technology: longer stems with larger diameter, earlier, more homogeneous flowering, & more compact inflorescence.

### GROWING

- GREENHOUSE
- VERTICAL FARM

### SPECTRA

- Bloom spectrum

### LAMPS

- Toplight Plus lamp
- Circular lamp



## LEAFY VEGETABLES

Leafy vegetables include lettuce, chicory, thyme, parsley, basil and other crops that are harvested at the time of maximum leaf growth. **BEGHELLI FIORE** ensures shorter production cycles, guaranteeing thriving production throughout the year and making it easier to control flowering.

### GROWING

- GREENHOUSE
- VERTICAL FARM

### SPECTRA

- Hortis spectrum
- Natural Indoor spectrum

### LAMPS

- Toplight Plus lamp
- Circular lamp



## BABY LEAF

Baby leaf crops include plants of lettuce, rocket, spinach, corn salad, cabbage and many others normally sold once they have grown 3-5 true leaves, about 20-40 days after sowing. Early harvesting, to ensure a higher number of cycles per year, is one of the primary goals that **BEGHELLI FIORE** research activity aims at.

### GROWING

- GREENHOUSE
- VERTICAL FARM

### SPECTRA

- Natural Indoor spectrum

### LAMPS

- Slim lamp
- Circular lamp



## MICROGREEN

Microgreens can be defined "baby" vegetable varieties as they are harvested as soon as they grow the first two true leaves, i.e. after about 7-20 days. The peculiarity of these crops is the very high levels of vitamins and antioxidants contained in their tissues, which, with **BEGHELLI FIORE** lamps, can be up to 40 times higher than in traditional vegetables.

### GROWING

- GREENHOUSE
- VERTICAL FARM
- GROW UNIT

### SPECTRA

- Natural spectrum

### LAMPS

- Slim lamp
- Circular lamp



## HEMP

Production of Hemp inflorescences for active principle extraction. **BEGHELLI FIORE** offers solutions to ensure earlier production & shortening of plant internodes: this increases the number of flowers and dry matter of the harvested product resulting in lower drying costs and higher production yields.

### GROWING

- GREENHOUSE
- VERTICAL FARM

### SPECTRA

- Purple spectrum
- Hortis spectrum
- Extended White spectrum

### LAMPS

- Slim lamp
- Circular lamp
- Interlight lamp
- Toplight Plus lamp



## MICROPROPAGATION

All the phases preceding field planting of micro propagated fruit plants are carried out in a completely sterile environment: cell multiplication, distension, rooting and finally, acclimatizing, in order to obtain, with **BEGHELLI FIORE** lamps, certified and virus-free material.

### GROWING

- VERTICAL FARM

### SPECTRA

- Micro-propagation spectrum

### LAMPS

- Slim lamp

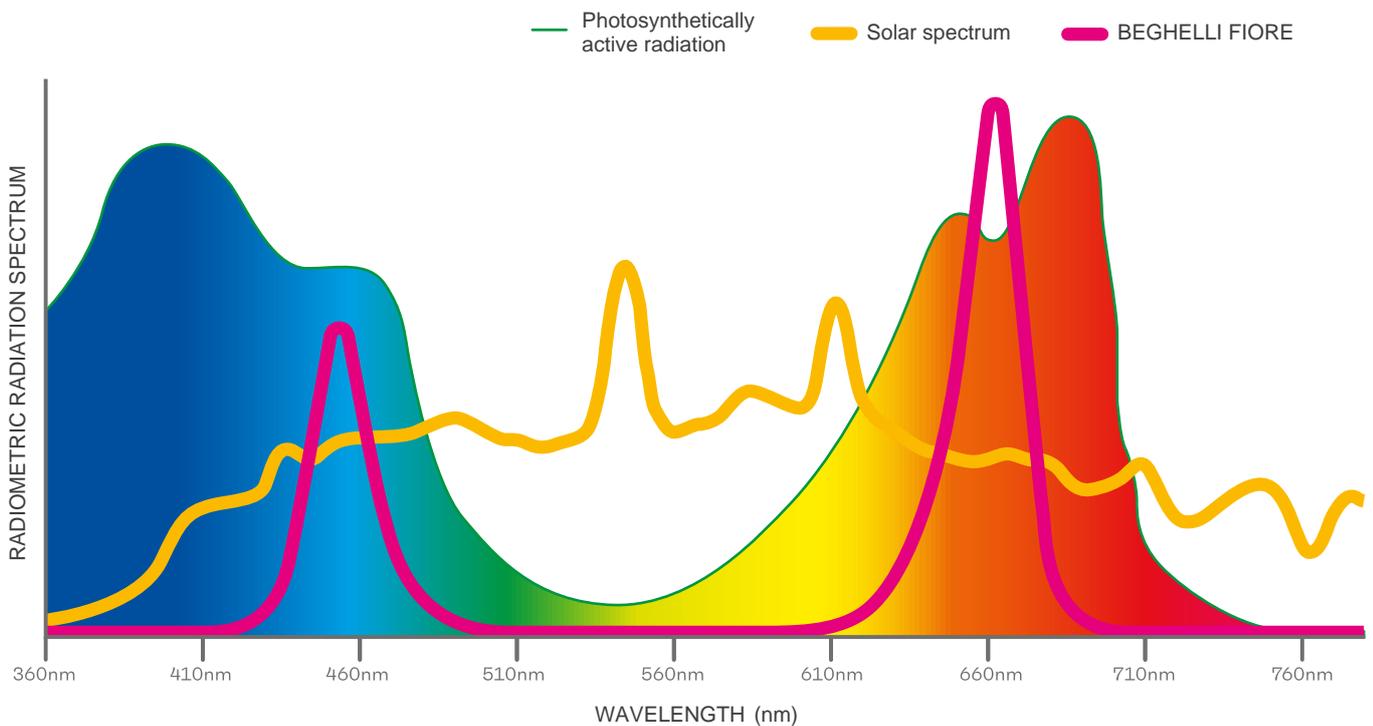
# EXPERTISE THAT GROWS AND GROWS.

**EACH PLANT HAS SPECIFIC LIGHT INTENSITY/TYPE REQUIREMENTS.**  
HOW CAN WE GET THE BEST PERFORMANCE FROM OUR PLANTS?

FIORE studies the correct recipe for each type of plant, at every stage of its growth. FIORE can count on a highly experienced research team: the company provides scientists and researchers at universities and research facilities with constant close support and they, in turn, support FIORE in developing cutting-edge products. Together with you, we can study and choose the right light recipe to optimize yield, also in line with your objectives. The best recipe combines several factors: light spectrum, intensity, schedules, uniformity and positioning.

**DIFFERENT COMBINATIONS OF LIGHT LET YOU CONTROL HIGHLY SPECIFIC PLANT CHARACTERISTICS, FROM COMPACTNESS TO COLOUR INTENSITY AND FOLIAGE DEVELOPMENT, THUS BOOSTING RESULTS.**

WE INVEST CONTINUOUSLY TO ENSURE THAT OUR LIGHTING PROPOSALS ARE ALWAYS STATE-OF-THE-ART. THROUGH CAREFUL DIFFERENTIATION OF LIGHTING SPECTRA, WE ARE ABLE TO GET THE VERY BEST OUT OF EVERY CROP.



## LIGHT THAT PLANTS LIKE

Chlorophylls (the molecules that make up plants) don't capture all wavelengths in the same way. Instead, they have a liking for some spectra rather than others. It is intuitively understandable that leaves reflect green light with ease; that is why they appear green, as they absorb only minimal amounts of this light. Blue and red spectra, instead, are vital to plants. Indeed, it is not by chance that the absorption peaks in chlorophyll types that play the main role in photosynthesis - chlorophyll a and chlorophyll b - are found across the blue and red wavelengths.



RESEARCH AND ANALYSIS OF THE PLANT LIFE CYCLE

GREENHOUSE DEVELOPMENT AND TESTING

PRODUCTION AND FEEDBACK FROM FIELD PARTNERS

# THE SPECTRA STUDIED BY BEGHELLI FIORE

RESEARCH ACTIVITY AT BEGHELLI FIORE HAS LED TO IDENTIFYING THE OPTIMAL SPECTRA FOR EACH CROP.



## SUNLIGHT

The Sunlight spectrum is used in Toplight and Interlight lamp applications for greenhouse production mainly of Cucurbitaceae e.g. melon, watermelon or cucumber.



## BLOOM

The Bloom spectrum is indicated to mainly induce flowering & is therefore chiefly used for ornamental crops.



## FRUITS

The Fruits spectrum is particularly suitable for small fruits such as strawberries, blueberries and raspberries in greenhouse production set-ups.



## NATURAL

The Natural spectrum, specific for delicate plants often found in nurseries. Grafted seedlings or seedlings that must become acclimatized to the open field can benefit from this light; excellent spectrum for microgreen growing.



## HORTIS

The Hortis spectrum is the main spectrum for many horticultural crops to be grown in greenhouses, mainly edible or herb type leafy crops, but also products suitable for indoor growing. It is used as Toplight for intensive tomato growing.



## PURPLE EVO

The Purple EVO spectrum is the spectrum commonly used for the production of algae in tanks or in photobioreactors.



## PURPLE

The Purple spectrum is the most indicated spectrum for the production of medicinal hemp.



## NATURAL INDOOR

The Natural Indoor spectrum is particularly suitable for the production of leaf and herb varieties, in production environments where the influence of outdoor lighting is reduced, such as in plant factories, in vertical farming or in containers.



## MICRO PROPAGATION

Highly recommended to support the growth of micro propagated plants, this light is also suitable for small fruits in indoor environments such as in plant factories and vertical farming.



## EXTENDED WHITE

"Like the sun". From HPS (High Pressure Sodium) to HPL (High Performance LED).



## MUSHROOMS

Specific spectrum for mushroom growing.

# EFFECTIVE LIGHT POSITIONING.

## ADVANTAGES OF USING LED LAMPS



SHORTENED GROWTH CYCLES



INCREASED PRODUCTION



IMPROVED PRODUCE SHELF LIFE AND TASTE



COLOUR AND SHAPE OPTIMISATION

**Sustainability and innovation** are key concepts in **BEGHELLI FIORE's** strategy. We work to ensure that our products are applied in synergy with the environment and protect it. Our state-of-the-art lamps are designed to help growers **increase yield, reduce costs and extend the growing season** of summer crops, guaranteeing production even in the winter period. Thanks to our lamps, the production yield can be increased **while improving the crops nutraceutical\* properties** (excellent nutritional quality, rich in vitamins and antioxidants).

Whatever the sector, maximizing the functional and aesthetic yield of the plants to optimize production is essential. **BEGHELLI FIORE** provides the right light needed to grow plants in any season, even in winter, driving specific agronomic responses such as flowering, maturation, leaf pigmentation and fruit ripening.

**BEGHELLI FIORE PROVIDES TOPLIGHT AND INTERLIGHT LAMPS FOR GREENHOUSE GROWING AND LIGHTING SYSTEMS FOR INDOOR GROWING (PLANT FACTORY, VERTICAL FARMING, MICROGREENS, MICROPROPAGATION).**

\*Foodstuffs with high levels of substances beneficial to our health.

BASED ON PROVEN SCIENTIFIC RESEARCH, WE HAVE IDENTIFIED THE CORRECT INCLINATION FOR LIGHT: FIORE LAMPS MAXIMIZE THE AMOUNT OF LIGHT THAT REACHES PLANTS.

## LIGHT INTENSITY AND ANGLE

Once the correct spectrum has been identified, the quantity of photons the plant needs to be supplied with becomes a vital parameter for ensuring proper growth patterns: it must not be too high as this could cause stress and reduce productivity but not too low because this would mean there is still margin for improvement. We study the amount of light needed by the plant according to its growth rate, morphology and age. We supply just the right amount of light using the most appropriate **BEGHELLI FIORE** lamps on the basis of the maximum light flow intensity they emit, positioning them at a distance that avoids dispersion (never too far away), and ensuring that the leaves intercept the light at an angle as close as possible to 90°.

# Toplight Combo

GREENHOUSE SERIES **c-led**



**PLUG AND PLAY**  
EASY INSTALLATION & ADAPTABILITY  
TO ANY KIND OF GREENHOUSE.



**LIGHT CUSTOMIZATION**  
QUALITY TO MEET  
PRODUCTION NEEDS.



**SLIM DESIGN**  
STUDIED TO FACILITATE THE  
PASSAGE OF SUNLIGHT.



**LOWER ENERGY CONSUMPTION**  
COMPARED TO CONVENTIONAL  
TOP-LIGHTING LAMPS



**LONG-LASTING LAMPS**  
AND LOW MAINTENANCE COSTS.



**BEGHELLI FIORE TOPLIGHT COMBO LAMPS OFFER UNIQUE BENEFITS, REPLACING CONVENTIONAL GREENHOUSE LIGHTING TECHNOLOGIES (HPS) WITH SYSTEMS THAT ARE HIGHLY EFFECTIVE FROM BOTH AN AGRONOMIC AND AN ENERGY VIEWPOINT.**

The types of light we propose, in conjunction with advanced technologies, ensure that our product is appreciated by those seeking cutting-edge solutions. Our top-lighting lamps produce less heat than conventional HPS ones (with differences of up to 30°C), allowing for in-greenhouse climate control according to the specific crops being grown: this lets growers position the lamps closer to the plants, thereby maximizing their absorption of light energy. Several TopLight Plus series types have been produced. They all have similar lamp bodies but differ from each other in terms of emitted light spectra in order to meet different growing requirements. Long-lasting lamps (average lifespan in excess of 50,000 hours) and low maintenance requirements, together with outstanding production results, allow us to offer a product which, from the farmer's viewpoint, will pay for itself sooner.

**COMPLETE TECHNICAL INFORMATION ON PAGE 19**



THE USE OF LED LAMPS IN THE MICROGREENS AND MICROPROPAGATION SECTOR IS AN INNOVATION THAT OFFERS NUMEROUS ADVANTAGES OVER CONVENTIONAL NEON LAMPS.

Tests conducted by **BEGHELLI FIORE** in collaboration with university research institutes have enabled us to develop a lamp specifically for micropropagation to offer a high-performance solution for a wide variety of plants. The greater energy savings obtained with Slim lamps allow for efficiency enhancement as well as shorter switch-on & switch-off

times. The size and the weight of the lamps, reduced to a minimum, together with their lower heat emission, allows us to keep the Slim lamps at a closer distance in plant factories or other similar seedling growing systems, improving photosynthetic efficiency and reducing consumption.



**COMPLETE TECHNICAL INFORMATION ON PAGE 20**

THE SPECTRUM OF LIGHT EMITTED BY **BEGHELLI FIORE** LAMPS HAS BEEN SPECIALLY DESIGNED TO ENSURE HARMONIOUS DEVELOPMENT & BETTER OVERALL HEALTH OF THE PLANT.

All these aspects facilitate the optimization of environment management & production yields.

# Cooperating and sharing skills.

## SOME INDUSTRIAL PARTNERSHIPS



Photobioreactor with Penta-Circular Light lamp

BY INTRODUCING THE C-LED LINE INTO THE **BEGHELLI FIORE** PORTFOLIO, WE HAVE SHARED SKILLS & KNOWLEDGE TO DEVELOP MORE INNOVATIVE AND EFFICIENT PROJECTS.

MUTUAL EXCHANGES OF EXPERIENCE AND NETWORKING FORM THE BASIS OF OUR GROWTH STRATEGY.

## TOMATO

Fri-EI is a company from the energy sector, which in recent years has expanded its skills to the plant growing field, in particular table tomatoes in high-tech greenhouse growing set-ups. Fri-EI, with its Fresh Guru brand, has relied on **BEGHELLI FIORE's** C-LED technology for a few years now to produce tomatoes all year, including in winter, in order to improve production yields and the quality of its products. The combination of a double row of Interlights, a top and a bottom one, maintains lighting coverage throughout the architecture of the lamp. The SUNLIGHT spectrum helps to enhance flowering and ensure a balanced, consistent growth of tomato plants all year round.

## MICROPROPAGATION

Micropropagation is the core business of Vitroplant, a farming company specializing in the multiplication of high-value plants such as small fruit shrubs or fruit trees, and in open field acclimatizing. Lighting management, the most critical and important process factor, is achieved with our technology. With **BEGHELLI FIORE's** C-LED technology, we have designed Slim lamps, suitable for confined spaces without natural lighting, & the PROPAGATION spectrum, specifically created to positively influence plants. The acclimatization phase is carried out in nurseries and to support the growth of already grown plants, Circular lamps have been installed, with the special NATURAL spectrum, particularly suitable for plants that have undergone stress, such as those that must adapt to open field conditions or have just been grafted.

## PHYTOTRONS

Agroservice Spa is a company based in the Marche region, in Italy, specializing in seed multiplication and research activities in the field of new cultivar breeding for herbaceous, forage and leguminous crops. In conjunction with **BEGHELLI FIORE's** C-LED technology, Agroservice has decided to invest in a new research project, in which the growth of hybrid wheat seedlings (the basic genetic material) occurs in a phytotron and lighting is guaranteed by **BEGHELLI FIORE's** C-LED technology. To help growers obtain seedlings with a stronger stem, a more intense shade of green and a higher number of spikes, we have installed Toplight Plus units and designed a completely new light spectrum specifically for wheat in a wholly innovative set-up.



## HEMP

Anubias, located in Villanova di Castenaso (Bologna, Italy), grows a Cannabis variety with low THC content using a hydroponic, soilless growing technique. Thanks to the **BEGHELLI FIORE's** C-LED technology, in terms of light distribution, intensity and spectrum, the quantity and quality of the harvest are enhanced.

## NUTRIENTS

Biolchim Spa is a company based in the Bologna area and specializing in the production and marketing of high-tech fertilizers, and in particular bio stimulants, designed to maximize crop productivity. Biolchim is particularly interested in LED lamps for horticulture, so much so that it recently installed a phytotron for specific trials on the nutrient requirements of plants under LED lighting, with a view to rewriting the fertigation formula. For trial purposes, Circular lamps have been installed particularly suitable for indoor environments.

## ALGAE

The "Photosynthetic & Microbiological" University of Florence spin-off initiative, founded by Professor Mario Tredici in 2004, which specializes in research, consultancy and sales of technological solutions for the cultivation of photosynthetic microorganisms (microalgae and cyanobacteria) for industrial applications, has chosen **BEGHELLI FIORE's** C-LED technology to assist in the study of the effects of LED lights on algae, in order to evaluate the effects of LED light on the physiology and biochemistry of photosynthetic microorganisms.

## FLOWERS

Nozza Luciano is a farm in the province of Bergamo that has been producing and marketing flowers since 1984. In order to improve production, mainly in autumn and spring, Nozza involved **BEGHELLI FIORE's** C-LED technology in a new trial, along with the University of Bologna, on the use of LED lights for different ornamental varieties, with excellent results in terms of flowering time, compactness, flower color and plant habit.

# Supporting each other and growing together

## OUR RESEARCH PARTNERSHIPS

PEOPLE HAVE ALWAYS GIVEN **BEGHELLI FIORE'S** C-LED INNOVATION ITS COMPETITIVE ADVANTAGE.

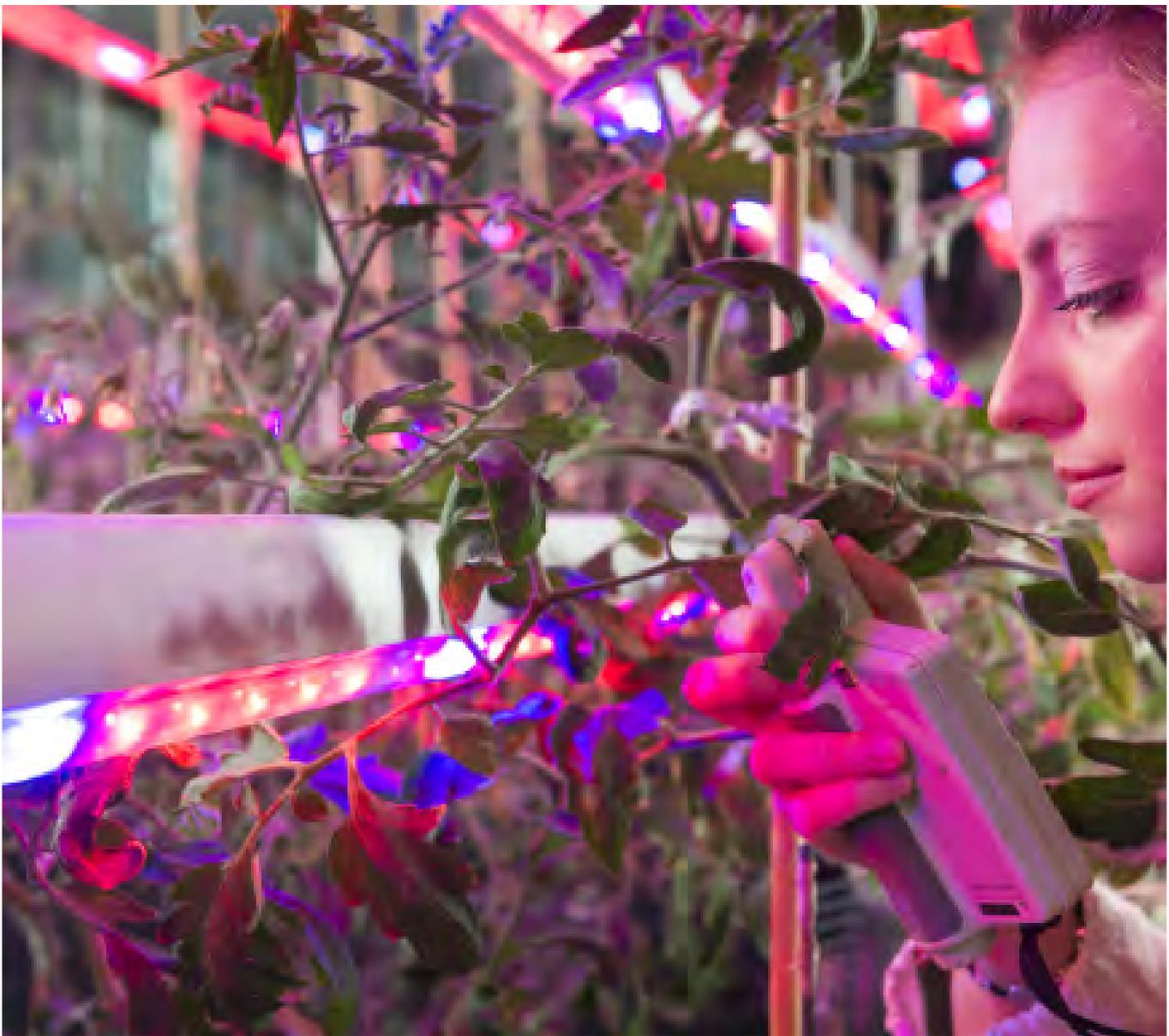
THE RELATIONSHIP WITH UNIVERSITIES WAS STARTED TO TRIGGER AND DEVELOP THE VIRTUOUS CIRCLE THAT RESULTS IN MOTIVATED PEOPLE AND INNOVATIVE AND SUSTAINABLE PROJECTS.

### RESEARCH ON ORNAMENTAL AND HORTICULTURAL PLANTS

- Studies and tests on the effects of Inter-Light lamps on vertical growing plants such as tomatoes and raspberries.
- Tests on strawberry plants in plant factories and in greenhouse gutter systems.
- Imola headquarters, ornamental plants: studies on effects of light spectra compared to natural light on ornamental plants illuminated with Toplighting Plus.

### RESEARCH ON MICROPROPAGATION

Founded in 1923, CNR is Italy's largest public research organization. In the agro-environmental science field, its studies mainly focus on the conservation of genetic resources, sustainable agriculture & traceability of production. The performed tests concern micropropagation, that is, the growth of arboreal plant shoots (mainly peach) inside special containers with a substrate containing glucose and other elements to obtain virus-free plants with optimal production standards.



### RESEARCH ON MICRO-ALGAE

The University of Florence studies a wide range of topics spanning from arboreal sciences to genetics and land management. Our experimentation largely focuses on the cultivation of spirulina and chlorella in waterfilled photobioreactors: light for photosynthesis is provided by special waterproof **BEGHELLI FIORE's** C-LED lamps with a 360° light flow.

### BASIC PHYSIOLOGICAL RESEARCH

Studies on the nutraceutical aspects of leafy plant varieties under differentiated LED light spectra. In addition to the quantity of light administered to the plants, the light spectrum plays an essential role in determining the build-up of antioxidant substances and vitamins.

- Controlled-environment experimentation on the correlation of exposure to UV-A and UV-B radiation with the synthesis of antioxidant molecules inside leaf tissues (in completely safe working conditions);
- Study on the nutraceutical properties of leafy products following exposure to spectra with different ratios of red light and blue light.

### RESEARCH ON TOMATO AND MICROGREENS

Several experimental projects focusing on testing the best production set-ups attainable with **BEGHELLI FIORE's** C-LED lamps in tomato and microgreen growing.

# TOPLIGHT COMBO LAMP

## GREENHOUSE SERIES

UP TO 3  $\mu$  mole/J

ELECTRICAL CHARACTERISTICS		
Power supply	90-30V~ / f=50-60Hz	249-528V~ / f=50-60Hz
Power absorbed	300W	600W
LIGHTING TECHNOLOGY CHARACTERISTICS		
PPF	PPF = up to 840 $\mu$ mole/sec	PPF = up to 840 $\mu$ mole/sec
MECHANICAL CHARACTERISTICS		
Mechanical dimensions	684 mm* 178 mm*103 mm	685 mm* 182 mm*220 mm
Protection degree	IP66	IP66
Average lamp lifetime	L70 > 50,000 hours	L70 > 50,000 hours
Operating room temperature	-10°C / +40°C	-10°C / +40°C

# SLIM LAMP

ELECTRICAL CHARACTERISTICS	
Power supply	24 V DC
Absorbed power	Up to 17W/m
LIGHTING TECHNOLOGY CHARACTERISTICS	
PPF	PPF = up to 35 $\mu$ mole/sec/m
MECHANICAL CHARACTERISTICS	
Protection class	IP65
Dimensions (L x W x H)	from 380 to 1630 x 12 x 16.3 mm
Average LED lamp lifetime	L70 > 50,000 hours
Work environment temperature	-10°C / +35°C





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