



# Greenhouse Project Portfolio



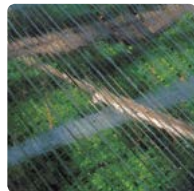


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## Nature. Optimized.



# Palram Projects Support

## About Palram

Palram was founded in 1963 and is a leading global manufacturer of semi-finished extruded thermoplastic sheets, panel systems and consumer products. Palram sheets are manufactured mainly from polycarbonate and PVC. They are designed for a diverse range of applications in various markets, which include DIY, construction, architectural projects, advertising, agricultural, glazing, and fabrication. Palram panel systems are offered as part of the company's advanced products and services bundle for the construction and architectural markets. A variety of finished-products are marketed through DIY chain stores across the globe.

## Project Support

In the last two decades, the Palram Projects Support Center has helped specify, adapt, support and facilitate commercial horticultural challenges around the globe. Among the Center's team members are civil engineers, designers, technical supporters, plastics engineers and others. The team offers a bundle of professional services based on accumulated experience in medium and large scale projects. A small sample is presented in this pamphlet.



## Services for Planners

### Planning Stage

- Promptly supplying the correct production specifications for each new project
- Adaptation of plans while preserving the planner's vision
- Creation of specific design details
- Professional consultation on planning meetings
- Professional consultation at planning sessions
- Creating conceptual designs for a given structure

### Implementation Stage

- Creating of specific installation guidelines for each project
- On-site support at important execution stages
- Background construction engineering supervision
- Conduction of special seminars upon request

# Greenhouse Solutions

The modern horticultural market creates demand for well-designed, high value-added and innovative greenhouses. This calls for flexible manufacturing and construction solutions. Our agricultural applications specialists deliver the technological expertise to customers in order to supply the most suitable greenhouse cover for your climate zone, crop, and structure.

- A wide range of products with varying thermal and optical properties.
- Flexible and robust manufacturing.
- Prompt technical support process.
- Strictly enforced quality assurance system.
- Assured Confidentiality.

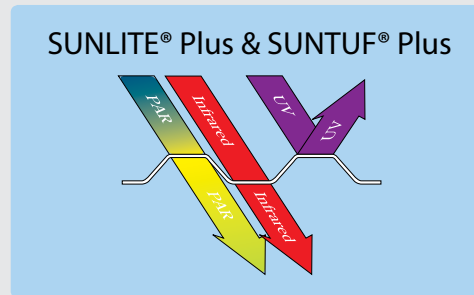
The strategic goal of our agricultural team is to increase your competitiveness by providing an application oriented support mechanism primarily focused on your unique engineering requirements. Our extensive experience is available whenever you need it. We are with you every step of the way.

## Main benefits

- Extreme load bearing
- Reduces condensation & drip
- Over 90% light transmission
- UV and weather resistant
- Optional UV protection on both sides
- Blocks out UV and far IR radiation
- A variety of light diffusion options
- Less snow buildup than any other material
- Ease and flexibility of installation
- 10 year limited warranty

## Special Features

- Condensation & Drip control
- Selective light options: The light spectrum was never this flexible
- Hemispherical light transmittance: up to 25% more light at low sun angles
- Twin wall / Multi wall for improved thermal insulation
- Light diffusion option: up to 100% Haze factor
- Embossment: maintains perfect light transmittance with beneficial light scattering
- Tailor made corrugation to match any installation





# SUNTUF® Plus

Condensation Control Corrugated Polycarbonate Sheet

## Overview

SUNTUF® Plus provides unique benefits which enable it to provide plants with the best nurturing conditions. The sheet includes a special built-in mechanism to reduce condensation & drip. This feature allows SUNTUF Plus to transmit optimal levels of PAR light in any weather condition and assist in protecting the crop in the greenhouse.

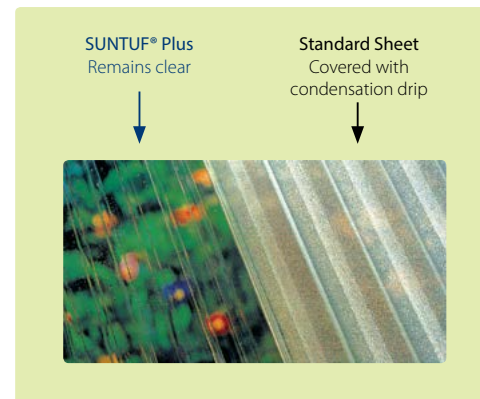
SUNTUF Plus maintains its superior mechanical properties for extended periods. It sets the standard for efficient greenhouse roofing with over 25 million square meters installed in numerous greenhouses around the globe.

## Main Benefits

- Up to 90% light transmission
- Reduces condensation & drip
- Retains its performance over time
- Virtually unbreakable
- Blocks out UV and far IR radiation
- Available with 20% and 100% light diffusion
- Allows energy savings of up to 50%
- Installation: Flexible installation, easy to work with, can be cold formed into arches
- Optional UV protection on both sides
- Wide service temperature range
- Available in 1,260 mm and 1,870 mm widths
- In cold climates - Reduces snow buildup in comparison with twin-wall sheets
- 10 year limited warranty

## Typical Applications

- Commercial Greenhouses
- Gardening Centers
- Swimming pools & spa facilities







# SUNLITE® Plus

Condensation Control Multiwall Polycarbonate Sheet

## Overview

SUNLITE® Plus combines high light transmission, excellent weather resistance and a unique Condensation & Drip Control feature beneficial for healthy plant growth in greenhouses and nurseries or for humid public areas such as swimming pools and spa facilities.

The tough multiwall polycarbonate structure and low weight reduce the cost of the supporting structure. Shatterproof polycarbonate coupled with an integrated UV resistant coextruded layer yield long service life, backed up by a 10 year limited warranty.

SUNLITE® Plus provides an optimal cultivation environment for agricultural greenhouses. From 6mm twin-wall to 16mm 7-wall sheet structures, SUNLITE Plus is available in a variety of configurations that can withstand the most extreme climates, providing energy efficiency for horticultural applications.

## Main Benefits

- Built-in condensation control reduces harmful effects of condensation and dripping
- Greater light transmission during low light periods and seasons
- Transparent: Up to 80% light transmission
- UV Protection: Co-extruded UV protection, single or both sides
- Blocks up to 99.9% harmful UV radiation
- Weather & UV Resistant
- High Thermal Insulation reduces sun generated heat while transmitting valuable PAR light for plant growth – Energetic Efficiency
- Impact resistant: Virtually unbreakable & rigid
- Lightweight
- Easy to work with and install, can be cold formed into arches
- Wide service temperature range

## Typical Applications

- Commercial Greenhouses
- Gardening Centers
- Swimming pools & spa facilities
- Packing and holding areas
- Skylights and Sidelights
- Covered walkways
- Industrial roofing and glazing



## Nurseries and Garden Centers

Plant nurseries require year-round protection and optimal growing conditions in order to yield high-value plants. Additionally, the overall indoor conditions should take into consideration and provide year-round comfortable shopping experience (during the cold winter months and hot summer days). Palram's products offer strength, security and ideal growing conditions.





## House plant sales center, Jerusalem

### The challenge

Designed for snowy winters (Yes, it does snow in Jerusalem), this house plant sales center was required not only to withstand winters with heavy snow and wind loads, but also to reduce indoors ambient heat during the hot summer months.

### The solution

Using PALRAM's SolarSmart technology, SUNTUF Plus panels can filter the near Infra-Red radiation and reduce heat build up significantly.

SUNTUF Plus Solar Control transfers only 30% of the NIR radiation ,but still transfer sufficient natural day light to provide a comfortable shopping experience.

### Technical details

SUNTUF Plus 0.8mm  
Greca Profile  
Solar Control





## Research and development centers

SUNTUF Plus and SUNLITE Plus offer maximal crop protection, crucial when dealing with high value crops, or High-Tech agricultural equipment.

The impact resistance of SUNTUF Plus complies with the high safety standards of advanced research and development centers.





## Agriculture Center of Excellence at the University of the Fraser Valley (UFV), Canada

The Agriculture Center of Excellence at the UFV campus in British Columbia is a 600m<sup>2</sup> 16mm SUNLITE Plus greenhouse, which allows for 95% light diffusion.

This greenhouse is the tallest in North America and the first greenhouse in the world that can be programmed to be either pressurized or de-pressurized.

The greenhouse incorporates features such as growth chambers, laboratories, research partnerships with biology and geography departments, and practical research in "friendly bugs".

### Technical details

SUNLITE Plus 16mm  
Clear Diffuser







## Extreme Climates

SUNTUF Plus is the world's toughest and strongest greenhouse cover.

Requiring minimal metal support structure, SUNTUF Plus can withstand extreme snow and wind loads and resist the strongest hail impacts.





## Vegetable production greenhouse farm, Astana, Kazakhstan.

Planned to withstand the extreme temperatures of  $-40^{\circ}\text{C}$  winters to  $+40^{\circ}\text{C}$  in summertime, this growing facility produces tomatoes and cucumbers under an area of 30,000 sqm.

Special light transmission technologies are used for enhanced bee pollination.

### Technical details

#### Roof:

SUNTUF Plus 0.8mm  
Omega Clear Embossed

Sunglass Plus 1.5mm  
Greca Clear

#### Walls:

SUNLITE Plus 8mm  
Clear









## Vegetable production greenhouse farm, Krasnodar, Russian Federation.

The climate in this area is characterized by extreme temperatures (-35°C to +40°C) and snow loads of 150 kg/sqm.

In this greenhouse, leafy greens are grown by hydroponic methods.

SUNTUF Plus provides both the load resistance and the thermal insulation required.

### Technical details

**Roof:**

SUNTUF Plus 0.8mm  
Omega Clear Embossed

**Walls:**

SUNLITE Plus 8mm  
Clear







## Xinjiang Agricultural University

This greenhouse is a demonstration facility at the Xinjiang Agricultural University. The temperatures in this part of the Gobi desert may drop to  $-25^{\circ}\text{C}$  in the winters, and the structure must endure high winds and snow storms.

The roof of the double slope greenhouse is covered with SUNTUF Plus. The Gable walls are 8mm twin wall SUNLITE Plus.

### Technical details

SUNTUF Plus 0.8mm  
Omega Clear Embossed





# Decorative Plants

## Ornamental plants

House plants and cut flowers require special protection and, in some cases, specific radiation filters and a high light diffusion factor.

SUNTUF Plus and SUNLITE Plus can offer the mellow light properties with various options of light diffusion and transmission.

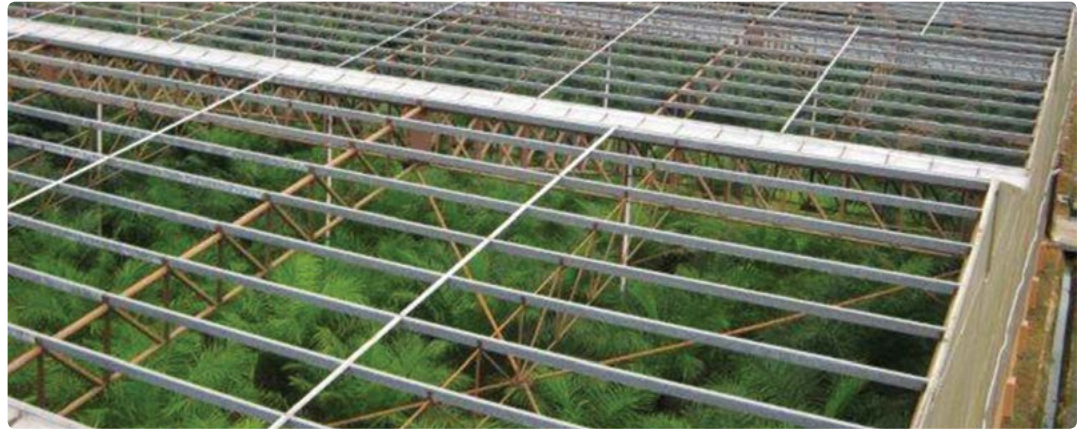


## Miniature tree greenhouse, Malaysia

This tropical trees nursery & greenhouse has a 22 meters wide gable span, requiring very long panels. This extremely wide structure reduces structural shadows.

### Technical details

SUNTUF Plus 0.8mm  
Omega Clear Embossed





## Orchard greenhouse, Panama

At 80,000 sqm, this is one of the world's largest and most advanced orchid greenhouse.

It includes a production center, breeding and development lab, and a distribution plant.

The SUNTUF Plus cover provides shelter from the tropical rains and extreme wind loads.

Providing 100% light diffusion, the microclimate inside the greenhouse is optimal for the various orchid types.

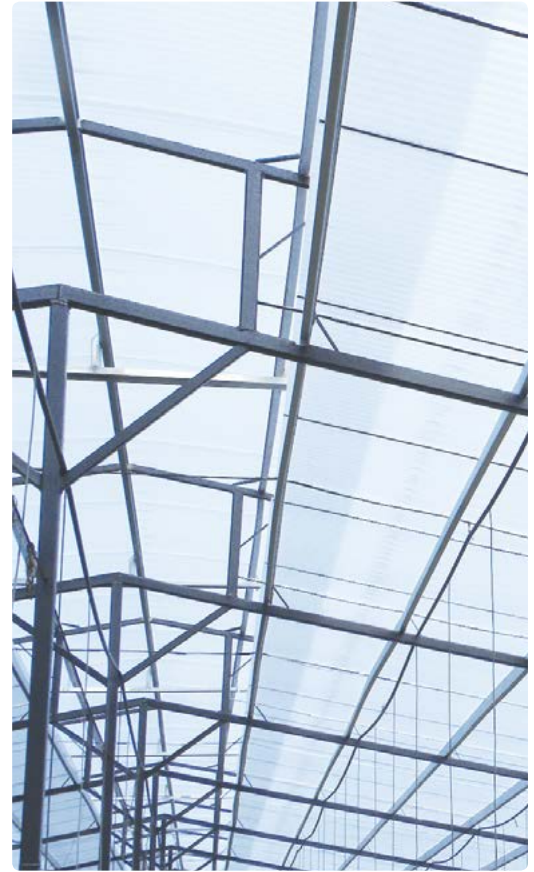
### Technical details

SUNTUF Plus 0.8mm

Omega White diffuser











## Potted plant nursery, Israel

This is one of the largest nurseries in the Middle East.

Most of the roofing of the greenhouse is clear SUNTUF Plus, while the most sun-sensitive plants are grown under white opal SUNTUF Plus roofing with 45% light transmission in order to protect the crops from the strong Mediterranean sun.

### Technical details

SUNTUF Plus 0.8mm

Omega White diffuser & Clear Embossed









## Potted plant breeding and production center, Israel

This was one of the first greenhouses to be covered with Palram's SUNTUF Plus.

In 1986 this grower chose to replace his poly-film cover with a rigid glazing.

It withstands snowy winters, heavy hail storms, and very hot summers, while breeding and producing top quality potted plants and miniature fruit trees.

Since 1986 the farm has grown and new structures were added, all covered with corrugated SUNTUF Plus roofs and multiwall SUNLITE Plus walls.

### Technical details

SUNTUF Plus 0.8mm  
Greca Clear embossed  
SUNLITE Plus 8mm twin-wall  
Clear











## Leafy Greens

In a SUNTUF Plus greenhouse ,the control of light, temperature ,and soil moisture levels reach their maximal accuracy.

SUNTUF Plus high light transmission and light diffusion options combined with excellent insulation properties and extreme impact resistance ,offer a solution for various types of crops in any climate.





## Fresh herbs, the Jordan River Valley

Its location in the Jordan Valley, at the desert's edge, is characterized by comfortable temperatures combined with strong sand storms 3 months of the year.

SUNTUF Plus provides a perfect solution, protecting the precious crops throughout the year and enabling the grower to maintain a steady supply to export markets.

### Technical details

SUNTUF Plus 0.8mm  
Omega Clear embossed





## Hydroponic greenhouse, The Middle East

Located in the Judean desert ,and constructed on top of an industrial warehouse amidst a bustling commercial area ,this Hi-Tech Hydroponic greenhouse produces a variety of leafy vegetables.

### Technical details

SUNTUF Plus 0.8mm  
Greca Clear embossed







## Tropical green vegetables production, China

A SUNTUF Plus greenhouse covering was required to shelter the green vegetables during the monsoon season. It also prevents heat stroke and photo inhibition during the hot and dry season.

The unique design enables excellent ventilation when the greenhouse walls are open, thus releasing excess heat.

An external retractable shading cloth helps to protect the plants during the hot season.

### Technical details

SUNTUF Plus 0.8mm  
Omega clear embossed









## Warehouses and Logistical Facilities

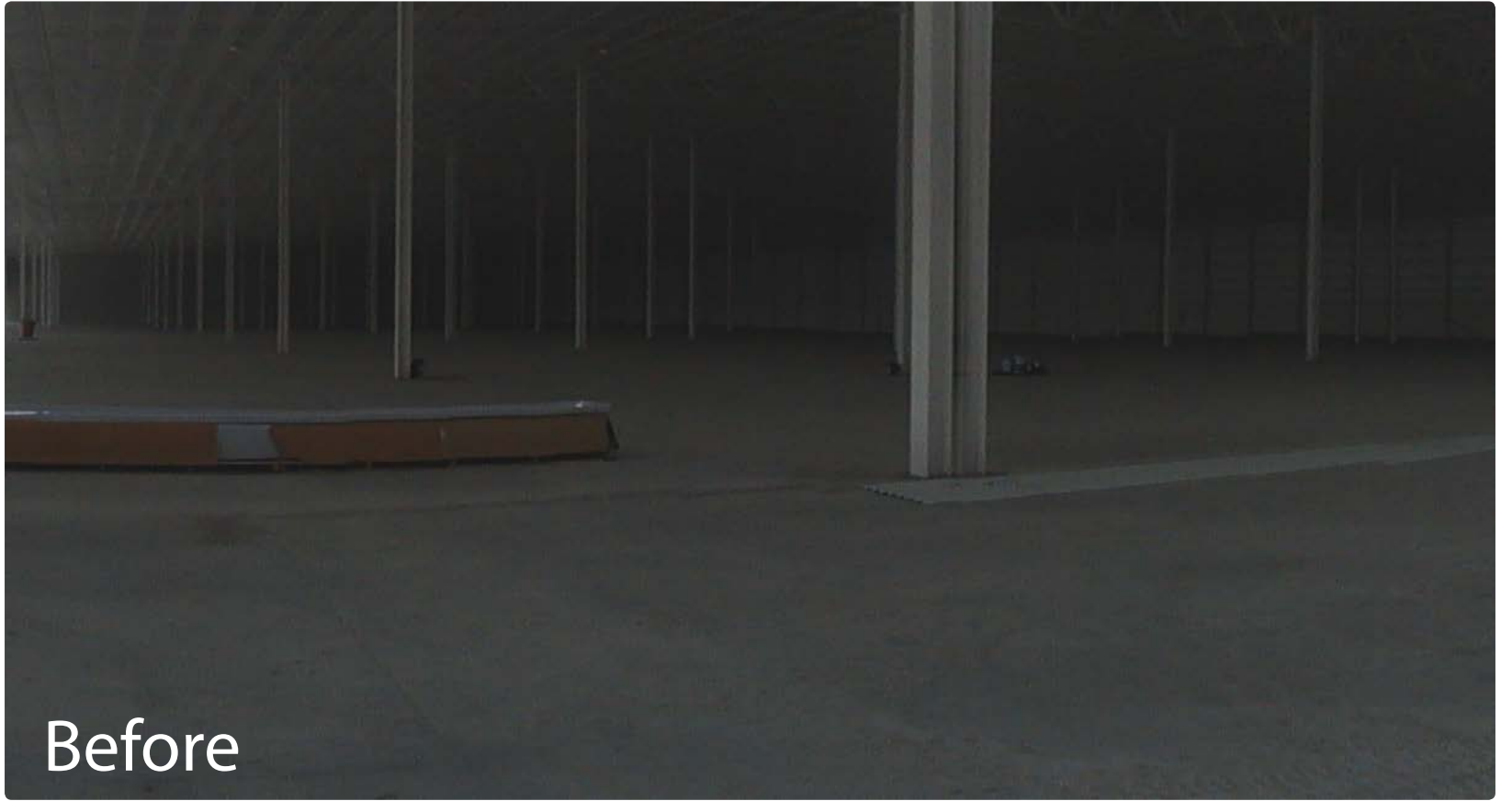
SUNTUF panels are used as rooflights and sidelights integrated into corrugated metal roofs. This allows architects and builders to take advantage of one of mother nature's best free resources, daylight.

A warehouse that's bright and full of light makes it easier to pick, pull, package and ship. SUNTUF's advanced profile matching technology allows it to be adapted to virtually any metal profile.

SUNTUF panels form a complete shield against harmful UV rays while admitting most of the visible light. The panels contribute to conservation of energy and improve the quality of the working environment.

Clear SUNTUF rooflights allow maximum light in, while a range of colors and diffusions will filter light or reduce heat loads.





Before





After

## Shafer packing facility, Israel

A 35,000 sqm of ornamental house plant production facility requires a large packing and logistical area.

Shafer chose a lightweight construction solution:

PALRUF, Palram's corrugated PVC panels were the primary covering material. SUNTUF was integrated into the roof as rooflights, enabling natural daylight to penetrate the facility.

SOLAR CONTROL smart technology blocks most of the infra-red radiation while allowing visible light penetration. This minimizes heat buildup, while providing a well lit and comfortable environment.

### Technical details

White PALRUF Industrial 2mm  
SUNTUF Industrial Solar Control 1mm

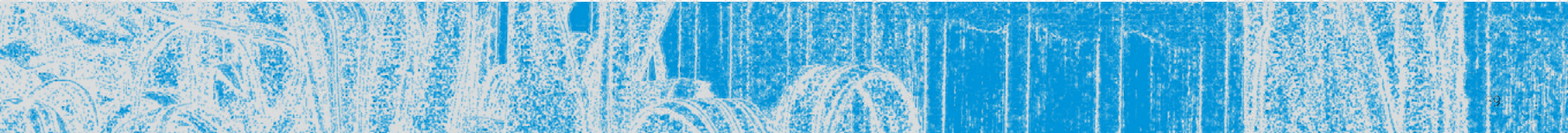




## Glass Replacement

Greenhouse owners choose SUNTUF Plus as a long term roofing solution to replace shattered greenhouse glass glazing panels. SUNTUF Plus provides a reliable and cost-effective roofing solution that resists high wind and impact caused by hail and debris. Palram tailors specific corrugation profiles for each project. The panels are designed to fit pre-existing aluminum glazing bars, which results in a very simple installation process. Technical support includes specific installation guides for each profile, specific accessories and on-site support.





## Albani E. Ruggieri, Italy

### The opportunity

A glasshouse farm located north-west of Rome suffered substantial damage due to wind and hail.

### The solution

Palram replaced the damaged roof by developing a new profile to perfectly fit the greenhouse's existing structure, eliminating the investment in metal works.

### Technical details

SUNTUF Plus 1.2 mm

Tailor made profile with an embossed surface finish











## De Filippo, Italy

### The opportunity

Just south of Naples, adjacent to the Mediterranean coast, the De fillipo glasshouse farm suffered repeated damage from the high wind loads typical for this area.

### The solution

Palram had to deliver a reliable and cost effective solution that could be quickly and easily installed.

A corrugation profile was designed to ideally match the aluminum glazing bars of the existing structure with maximum precision.

### Technical details

SUNTUF Plus 1.2mm

Tailor made profile with an embossed surface finish







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81863 - 08.2017

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