EU Solar greenhouse fruit and vegetables production: the green ally to mitigate climate change

-- Albedo effect, no fossil fuels consumption, carbon sink effect and ultra-efficient water saving systems are unique features of greenhouse fruit and vegetables production in southern Spain

-- Continuous innovation and environmentally responsible techniques consolidate the solar greenhouse fruit and vegetables production in the south of Spain as the world´s most sustainable and a key tool to fight global warming

-- The solar greenhouses in Almería and Granada provide 500 million people with fruit and vegetables during the winter, when continental production is not viable, contributing to the EU's food autonomy in a global context of increasing population and scarcity of water and agricultural land.

Brussels, Belgium (11.11.2020) – Almería & Granada solar greenhouse coastal zone, in southern Spain, is one of the few areas on Earth where the temperature has fallen, rather than risen, since 1984. This is due to the reflection of sunlight on the white lime (natural calcium carbonate) of the plastics covering the region´s solar greenhouses, also known as the **albedo effect**. Additionally, each one of the 30,000 hectares of solar greenhouses absorbs the CO2 emitted by 8 cars a day, which means that the **emissions of almost a quarter of a million cars are neutralized**. Hence, under those plastics covering one of the most advanced agricultural production areas in the world there is a green blanket that benefits us by fighting global warming.

"Innovation for sustainability is our raison d'être and we are confident that this is the only viable long-term strategy to secure the future of our business and our planet", said Francisco Góngora, president at Hortiespaña. "Contemplating the albedo effect of solar greenhouses, their low carbon footprint and high carbon sink effect or the use of the sun as their unique source of energy, we can infer that solar greenhouse production of fruit and vegetables contributes to the fight against climate change and to our future ability to feed the world´s growing population".

No fossil fuel consumption

The solar greenhouses in Almería and Granada provide 500 million people with vegetables during the winter, when continental production is not viable. This not only contributes to the EU's food autonomy in a global context of increasing population and scarcity of water and agricultural land but it also does so almost exclusively thanks to natural ventilation and roof bleaching as climate control systems. Natural ventilation allows the temperature, humidity and CO2 concentration values inside the greenhouse to be controlled, while the bleaching of the roof brings a reduction in solar radiation inside the greenhouse, allowing the crops to carry out

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their photosynthetic activity, and also providing the energy that heats the plants, the soil and the air. **The result is that 96% of the energy consumed for the production of 4,5 million tons per year of nutritious and healthy food is of solar origin, minimizing the use of energy of fossil origin.**

Albedo effect

In 2007, it was observed that the pattern of temperature variability for southeast and east Spain has tended to increase by +0.54°C per decade since 1973, indicating an accelerated warming of the region[1]. However, the Almeria weather stations near greenhouses reported the opposite trend, with a slight cooling of -0.30ºC per decade for the same period[2]. This change is explained by the fact that the white plastic surface of the solar greenhouses has increased the reflection coefficient for solar radiation, known as albedo, by +0.09 with respect to the original terrain. Therefore, the effect of this large white area on the albedo is comparable to that produced by snow on a forest at high altitudes. **The result is an overall reduction in the net radiation on the land surface of this area (-22.8 Wm-2) and, consequently, a reduction in the average annual temperature of -0.25 ºC[3].**

Efficient water use

In a context of irregular and scarce rainfall, producers understand that water is a very valuable resource. As a result, throughout the transformation of the region´s agricultural model, new technologies have been introduced to reduce consumption. Today, this culture of innovation has turned Almería and the coast of Granada into the most technologically and efficiently irrigated area in Spain. Techniques such as *sanding*, which reduces salinity and alkalinity and has a high capacity for retaining humidity, high frequency localized irrigation, computerized controls, the application of sensors to the crops, the use of plastic mulches, the development of soilless crops or the use of structures with rainwater harvesting systems, are continuously in development in the region, benefiting other less advanced production areas around the world by sharing and spreading these environmentally friendly technologies.

[1] Brunet, M., P. D. Jones, J. Sigró, O. Saladié, E. Aguilar, A. Moberg, P. M. Della-Marta, D. Lister, A. Walther, and D. López (2007): "Temporal and spatial temperature variability and change over Spain during 1850–2005". Journal of Geophysical Research Atmospheres, 112; D12117.

[2] Campra, P.; García, M.; Cantón, Y.; Palacios-Orueta, A. (2008): "Surface temperature cooling trends and negative radiative forcing due to land use change toward greenhouse farming in southeastern Spain". Journal of Geophysical Research Atmospheres. 113; D18109.

[3] Campra, P. y Millstein, D. (2013): "Mesoscale climatic simulation of surface air temperature cooling by highly reflective greenhouses in SE Spain". Environmental Science & Technology, 47(21):12284-12290.

About CuTE SOLAR:

The EU financed CuTE-SOLAR is a promotion program that brings together a consortium made up of the Association of Producer Organizations of Fruit and Vegetables of Andalusia (APROA-Spain), the Spanish Fruit and Vegetables Interbranch Association (HORTIESPAÑA) and FruitVegetablesEUROPE (EUCOFEL) The campaign aims to raise awareness of the specific characteristics of agricultural production methods in the EU solar greenhouses, especially in key areas such as sustainability and respect for the environment and people, and the safety, quality and traceability of crops... Actions will be conducted in three EU countries (Belgium, Germany and Spain) from 2020 to 2022.

For more information contact:

Christine Burger
cburger@cognito-pr.de
+49 89 12090132

Álvaro de Mingo
ademingo@admmr.com
+34 659 093 183
cutesolar.eu