

How to optimize Chinese solar greenhouse?

The greenhouse optimizing strategy combined lighting, heat storage and safety. The average solar radiation and temperature increased by 5.4 MJ m<sup>-2</sup> and 3.1 °C. The cost of optimizing Chinese solar greenhouse can be repaid in 1.6 years. The proposed framework can be applied to solar greenhouses at any latitude.

Can a Chinese solar greenhouse maximize solar energy utilization?

Given the aging of greenhouse facility, there is a need for investigating the transformation of existing greenhouses to maximize solar energy utilization. In this study, Chinese solar greenhouse (CSG) in the Beijing area served as an optimized prototype. A mathematical model was established to determine the range of CSG vertex positions.

How many passive solar greenhouses are there in China?

In China, there are 800,000 hectares of passive solar greenhouses, which is 80 times the surface area of the largest glasshouse industry in the world, that of the Netherlands. These greenhouses have three walls made of brick or clay.

How does a Chinese greenhouse perform?

The performance of a Chinese greenhouse depends on its design, the latitude, and the local climate. A recent study observed three types of greenhouses in Shenyang, which is at 41.8°N and is one of the most northern areas where the Chinese-style greenhouse is built (between latitudes 32°N and 43°N).

How do Chinese passive solar greenhouses work?

Today's Chinese Passive Solar Greenhouses often use solid walls of bricks or clay on three sides. The fourth side, usually facing south, is transparent, often with plastic film. This design captures solar energy during the day through the transparent side. At night, the thick walls release stored heat, slowing down heat loss.

Which CSG is best for Chinese solar greenhouse?

Total light interception and daily effective accumulated temperature of Chinese solar greenhouse with different lighting roof shapes. According to the above obtained results, the five CSGs with the optimum performance have been determined (S09, S109, S110, S120, S121).

Similar to high tunnels, Chinese-style solar greenhouse is an important tool for season extension in specialty crop production in China. The structures are facing south, featured by supporting north walls (Figure 1 and ...

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In China, fully passive solar greenhouses for the cultivation of fruits and vegetables in winter season have been successfully implemented since the 1980s. The main feature of the passive solar greenhouse designed and adopted in China is its ability to retain as much warmth as possible, allowing to grow

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In this study, Chinese solar greenhouse (CSG) in the Beijing area served as an optimized prototype. A mathematical model was established to determine the range of CSG vertex positions. Then, a 3D dynamic simulation model was developed to optimize greenhouse structure and determine the lighting roof shape that offers better light and temperature ...

The layout of such photovoltaic panels can be well adapted to Chinese solar greenhouse, and the scheme and the model can also be widely applied to other types of greenhouses. Discover the world's ...

There is a special type of solar greenhouse that is common in China but largely unknown in the rest of the world. The concept originated in the 1970s and 80s and has been promoted by the government in China. To maximize solar heat collection, the greenhouse is facing south but has solid walls on its north (back), east and west side. Another ...

Similar to high tunnels, Chinese-style solar greenhouse is an important tool for season extension in specialty crop production in China. The structures are facing south, featured by supporting north walls (Figure 1 and 2). The north walls are essential in maintaining temperatures inside the structure. They are made up with materials ...

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To improve the prediction accuracy of temperature and humidity in typical Chinese solar greenhouses, this paper proposed a new longwave/shortwave radiation modeling method using bond graph. This model ...

The Chinese Greenhouse is a full-color comprehensive guide to these passive solar greenhouses for self-sufficiency and growing year-round in soil or aquaponic grow beds with no additional heat. Coverage includes: How to design, build, ...

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The solar heat gain inside a passive greenhouse is mainly through the south roof cover [21] with a high solar transmissivity being especially important for a good greenhouse design [22]. Thus, additives and agents have been added to the plastic film and coating agents have been applied to the film surface to create functional films to cover the CSGs with greatly ...

Our team has compiled the design, planning and construction principles of Chinese solar greenhouses (CSG) after 40 years of effort, taking into account both theoretical and practical ...

Chinese-style greenhouses are catching the eye with their unique, energy-efficient designs. LOW TECH MAGAZINE reports that these greenhouses use only solar energy. Even in cold weather, they can keep the inside up to 25°C (45°F) warmer than the outside.

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