

数字农业 农机装备

温室太阳能与空气源热泵联合加温系统的试验

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摘要:

为了探索太阳能、空气源热泵技术在设施农业领域的应用方法和发展潜力, 寻求解决温室加温费用高、存在污染等问题的方法, 对一种用于温室的太阳能和空气源热泵联合加温系统进行了实验研究, 介绍了系统的总体设计和试验方法, 并在昆明地区对系统性能和温室加温效果进行了实验。结果表明: 在昆明地区最冷月1月, 蓄热水箱平均水温可达41.1℃, 空气源热泵运行时, 制热系数COP平均值均在3以上。无论晴天还是阴天, 温室都能够满足作物生长需求。为太阳能空气源热泵联合作为温室有效的加温系统提供了一定的理论依据。

关键词: 太阳能; 空气源热泵; 温室; 加温

Experiment on Greenhouse Solar Energy Associated with Air-source Heat Pump Heating System

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Abstract:

In order to explore the application methods and development potential of solar energy and air source heat pump (ASHP) technology in facility agriculture, and to seek a solution to resolve problems existing in greenhouse production, such as high heating cost and environment pollution etc., an experiment was carried out on a solar air source heat pump heating system used for greenhouse. In this paper, the overall design and operation method for the system were introduced, and an experiment on the system's operation performance and heating efficiency in greenhouse was tested in Kunming. The results showed that in January, the coldest month in Kunming, the average temperature of a heat storage tank could reach up to 41.1℃, and the average of COP were over 3 when the ASHP was running. Whether it is sunny or cloudy, the temperature inside of greenhouse can meet the needs for crop development. Thus, a theoretical basis is provided for the research on solar energy associated with air source heat pump heating system.

Keywords: solar energy air-source heat pump greenhouse heating

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