空气流速对温室地下蓄热系统湿热传递影响试验 Influence of Air Velocity in Heat Exchanging Pipes to Heat Change and Water Vapor Transformation for Underground Heat Storage System in Greenhouse

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关键词： 双层覆盖温室 地下蓄热系统 流速 热量 水蒸气

摘 要： 为确定双层覆盖温室地下蓄热系统换热管道空气流速对蓄热量和水蒸气迁移的影响，建立合理的运行模式，测试了该系统以0.6～2.8 m/s的空气流速蓄热时换热管道进、出口空气温度和相对湿度、地坪温度、室外温度，计算了换热管道进出口处空气含湿量与焓及蓄热功率。结果表明，在冬季白昼晴朗时，系统分别以0.6、1.0、1.5、2.0、2.5、2.8 m/s的空气流速进行蓄热，温室内热空气流经换热管道焓值明显降低，以不同流速蓄热时进、出口空气焓差的变化幅度、变化趋势相近，换热均充分；蓄热功率随流速增加而增加，当空气流速小于2 m/s时，蓄热功率不足，系统蓄热时较佳的空气流速为2.5～2.8 m/s，蓄热时间应以10:30～14:30为宜。 The effects of the air velocity in heat exchanging pipes to heat and water vapor transformation was conducted in double-film covering greenhouse and the rational running mode was presented. The temperature and humidity in inlet and outlet of heat exchanging pipes, floor temperature in heat storage greenhouse and outside temperature were measured at different air velocities in the heat exchanging pipes. The humidity ratio, enthalpy of inlet and outlet of heat exchanging pipes and the power for heat saving were calculated. The results showed that the enthalpy of hot air decrease apparently after flowing through heat exchanging pipes when the air velocity in heat exchanging pipes was respectively 0.6 m/s, 1.0 m/s, 1.5 m/s, 2.0 m/s, 2.5 m/s and 2.8 m/s during heat saving in clear day. In addition, the air enthalpy difference between inlet and outlet of heat exchanging pipes and its variation tendency were similar at different air velocities. The power for heat saving enhances with the increase of the air velocity in heat exchanging pipes. The power and the increase of floor temperature held lower when the air velocity in heat exchanging pipes was less than 2 m/s during heat storage. The appropriate air velocity in heat exchanging pipes was 2.5 m/s to 2.8 m/s, and the rational time for heat saving was 10:30 to 14:30.

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