

下挖深度对节能日光温室环境因子日变化及空间分布的影响

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Effects of sunken depth of energy-saving solar greenhouse on the diurnal variation and spatial distribution of environmental factors in the greenhouse.

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摘要 对山东省泰安市下挖0、0.5、1.0、1.5 m节能日光温室(不同下挖深度温室的结构参数完全一致)太阳直射辐射能截获量进行分析,研究了2009年12月20日—24日(冬至日前后)和2010年6月19日—23日(夏至日前后)温室环境因子日变化规律及其空间分布特点.结果表明:随着下挖深度的增加,下挖壁面在温室内的阴影面积逐渐增加,进入室内的太阳直射辐射逐渐由南向北迁移,地面辐射/后墙辐射值逐渐减小;日光温室下挖深度在0~1.0 m时,下挖越深,温室气温和地温增温效果越显著、保温效果越好,下挖深度达1.5 m时增温效果则显著下降、最低地温偏离度增大;下挖越深,温室内光照度越低、相对湿度越大.兼顾温室的采光与保温性能,泰安地区10 m跨度的下挖式日光温室的适宜下挖深度应不超过1.0 m.

关键词: 下挖深度 节能日光温室 环境因子 空间分布

Abstract: Taking the energy-saving solar greenhouses with the same infrastructure but different sunken depths (0, 0.5, 1.0, and 1.5 m) in Tai'an of Shandong Province as test objects, this paper analyzed the intercepted amount of direct solar radiation energy, and studied the diurnal variation and spatial distribution patterns of environmental factors in the greenhouses on winter solstice (December 20-24, 2009) and summer solstice (June 19-23, 2010). With the increase of sunken depth, the shadow areas in the greenhouses caused by sunken profiles increased gradually, the direct solar radiation energy into the interior of the greenhouses shifted from south to north, and the ratio of ground radiation to back wall radiation decreased gradually. Within the range of 0-1.0 m sunken depth, the air temperature and soil temperature in the greenhouses increased significantly with increasing sunken depth; but when the sunken depth was 1.5 m, the warming effect declined significantly, and the deviation of the lowest soil temperature increased. The deeper the sunken depth, the lower the light intensity and the higher the relative humidity in the greenhouses were. In considering of both lighting and heat preservation, the appropriate sunken depth of energy-saving sunlight greenhouses with a span of 10 m in Tai'an region should be less than 1.0 m.

Key words: sunken depth energy-saving solar greenhouse environmental factor spatial distribution

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