张 治,田富强,钟瑞森,胡和平.新疆膜下滴灌棉田生育期地温变化规律[J].农业工程学报,2011,27(1):44-51

新疆膜下滴灌棉田生育期地温变化规律

Spatial and Temporal pattern of soil temperature in cotton field under mulched drip irrigation condition in Xinjiang

投稿时间：5/22/2010 最后修改时间：9/26/2010

中文关键词: 灌溉 棉花 温度 土壤水分 地温 干旱区 膜下滴灌

英文关键词: irrigation cotton temperature soil moisture soil temperature hyper-arid area mulched drip irrigation

基金项目: “十一五”国家科技支撑计划项目（2007BAD38B01）

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中文摘要:

覆膜条件下地温将发生改变，为研究其变化规律，2008和2009年在新疆库尔勒市开展了棉花膜下滴灌田间试验，设置了不同灌溉处理和地表覆盖情况的试验小区，对土壤水热状况进行了监测和对比，结果表明：气象条件、土壤水分、地膜和棉株覆盖等因素综合影响棉花生育期地温分布规律，出苗期15 cm深度处膜下地温高于膜间1.6℃，蕾期和花铃期膜间地温逐渐超过膜下，吐絮期二者又趋于相等；土壤水分和温度存在耦合作用，土壤含水率高则热容量大，相应的温度变化幅度小，但在相同的含水率下，覆膜处理平均地温高于无膜处理。研究表明，膜下滴灌有效起到保温保墒作用，克服土壤高地温低含水率或低地温高含水率的矛盾，可为作物生长创造较好的土壤水热条件。

英文摘要:

Temperate soil heat condition, together with suitable soil moisture condition, is of critical importance for crop growth. Film covering is a beneficial agronomic measure and changes the soil temperature dynamics significantly. To quantify such influences in the hyper-arid area, field experiments were implemented in Xinjiang Province in 2008 and 2009. Soil moisture and temperature time series data were obtained for different irrigation and agronomy treatments. The results indicated that: the spatial pattern of soil temperature along the horizontal direction would depend on the combinational influence of meteorological, growing, soil moisture, and mulching conditions. Soil temperature in the intra-film location was 1.6℃ higher than that in the inter-film location at 15cm depth in the seedling phase. The inter-film temperature exceeded the intra-film temperature in the bud phase and flowering phase, while the two temperatures collapsed together in the blooming of boll phase. Soil moisture and heat movements were intimately coupled. The amplitude of soil temperature with high soil moisture condition was small due to its big heat capacity. The average mulched soil temperature within 25cm depth was 2℃ higher than the bare soil temperature after irrigation under the same moisture condition. The experiment showed that the mulched drip irrigation can provide more suitable soil moisture and heat conditions for cotton growth.

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