

地面覆盖和保水剂对冬小麦生长和降水利用的影响

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Effects of ground cover and water-retaining agent on winter wheat growth and precipitation utilization.

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摘要

在河南省西部丘陵旱耕地上,研究了保水剂(0、45、60 kg·hm⁻²)、秸秆覆盖(3000和6000 kg·hm⁻²)和地膜覆盖(<0.005 mm)对冬小麦生长发育、土壤水分和降水利用的影响。结果表明:3种措施均能促进冬小麦生长,改善土壤水分和养分状况,提高冬小麦产量和降水利用效率,特别是保水剂与秸秆覆盖、保水剂与地膜覆盖相结合效果更显著。与对照相比,不同措施使冬小麦不同生育期土壤含水量提高0.1%~6.5%,拔节期前地膜覆盖处理保墒效果最佳,拔节期后保水剂处理保墒效果最佳,扬花期和灌浆期墒情最差。不同措施使冬小麦产量比对照提高2.6%~20.1%,并以秸秆覆盖+保水剂处理最佳,增产14.2%~20.1%;其次为地膜+保水剂处理,平均增产11.9%。不同措施降水利用效率存在相同趋势,比对照提高0.4~3.2 kg·mm⁻¹·hm⁻²,表明地面覆盖和保水剂的应用改善了农田土壤水分状况和养分状况,提高了降水利用率,从而促进了冬小麦分蘖,提高了穗粒数和千粒重。

关键词: 冬小麦产量 保水剂 地面覆盖 土壤水分 降水利用

Abstract:

An investigation was made at a hilly upland in western Henan Province to understand the effects of water-retaining agent (0, 45, and 60 kg·hm⁻²), straw mulching (3000 and 6000 kg·hm⁻²), and plastic mulching (thickness <0.005 mm) on winter wheat growth, soil moisture and nutrition conditions, and precipitation use. All the three measures promoted winter wheat growth, enhanced grain yield and precipitation use efficiency, and improved soil moisture and nutritional regimes. These positive effects were more obvious when the straw- or plastic mulching was combined with the use of water retaining agent. Comparing with the control, all the measures increased the soil moisture content at different growth stages by 0.1%-6.5%. Plastic film mulching had the best water-retention effect before jointing stage, whereas water-retaining agent showed its best effect after jointing stage. Soil moisture content was the lowest at flowering and grain-filling stages. Land cover increased the grain yield by 2.6%-20.1%. The yield increment was the greatest (14.2%-20.1%) by the combined use of straw mulching and water-retaining agent, followed by plastic mulching combined with water-retaining agent (11.9% on average). Land cover also improved the precipitation use efficiency (0.4-3.2 kg·mm⁻¹·hm⁻²) in a similar trend as the grain yield. This study showed that land cover and water-retaining agent improved soil moisture and nutrition conditions and precipitation utilization, which in turn, promoted the tillering of winter wheat, and increased the grain number per ear and the 1000-grain mass.

Key words: winter wheat yield water-retaining agent land cover soil water precipitation use efficiency

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