

晋西黄土区果农间作的种间主要竞争关系及土地生产力

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Main interspecific competition and land productivity of fruit-crop intercropping in Loess Region of West Shanxi.

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摘要

以晋西黄土区核桃×花生、核桃×大豆、苹果×花生和苹果×大豆4种典型果农间作模式为研究对象,分析果农间作模式中作物光合有效辐射(PAR)、净光合速率(P_n)、土壤水分和产量情况,结果表明:与农作物单作相比,间作模式中作物的PAR和 P_n 均出现不同程度的降低,并且离树体越近,PAR和 P_n 越小; P_n 与作物产量呈显著正相关,说明光照是影响作物产量的重要因素之一;从整体趋势来看,核桃间作农作物0~100 cm土壤水分与相应单作模式间无明显差异,而苹果间作农作物0~100 cm土壤水分与相应单作模式间差异显著,说明苹果对作物土壤水分的竞争比核桃剧烈。研究区果农间作的土地利用效率平均提高70%,经济效益平均提高14%,且核桃间作模式优于苹果间作模式。为了提高间作作物产量,应加强水肥管理、增加树体与作物的间作距离或设置根障、定期适当修剪果树并种植耐荫作物。

关键词: 果农间作 光合有效辐射 净光合速率 土壤水分 生产力

Abstract:

Taking the four typical fruit-crop intercropping models, *i.e.*, walnut-peanut, walnut-soybean, apple-peanut, and apple-soybean, in the Loess Region of western Shanxi Province as the objects, this paper analyzed the crop (peanut and soybean) photosynthetic active radiation (PAR), net photosynthetic rate (P_n), yield, and soil moisture content. Comparing with crop monoculture, fruit-crop intercropping decreased the crop PAR and P_n . The smaller the distance from tree rows, the smaller the crop PAR and P_n . There was a significantly positive correlation between the P_n and crop yield, suggesting that illumination was one of the key factors affecting crop yield. From the whole trend, the 0-100 cm soil moisture content had no significant differences between walnut-crop intercropping systems and corresponding monoculture cropping systems, but had significant differences between apple-crop intercropping systems and corresponding monoculture cropping systems, indicating that the competition for soil moisture was more intense in apple-crop intercropping systems than in walnut-crop intercropping systems. Comparing with monoculture, fruit-crop intercropping increased the land use efficiency and economic benefit averagely by 70% and 14%, respectively, and walnut-crop intercropping was much better than apple-crop intercropping. To increase the crop yield in fruit-crop intercropping systems, the following strategies should be taken: strengthening the management of irrigation and fertilization, increasing the distances or setting root barriers between crop and tree rows, regularly and properly pruning, and planting shade-tolerant crops in intercropping.

Key words: fruit-crop intercropping photosynthetic active radiation net photosynthetic rate soil moisture content productivity

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