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间作栽培对连作马铃薯根际土壤微生物区系的影响

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Effect of Intercropping on Soil Microflora in Rhizosphere Soil of Potato Under Continuous Cropping

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摘要 为探究不同间作栽培模式缓解马铃薯(*Solanum tuberosum*)连作障碍的可行性及作用机制，以马铃薯单作为对照，研究马铃薯间作玉米(*Zea mays*)、蚕豆(*Vicia faba*)和荞麦(*Fagopyrum esculentum*)3种模式对连作马铃薯根际土壤养分含量及微生物区系的影响。结果表明，间作种植模式下马铃薯根际土壤全氮、全磷、速效磷和速效钾含量显著低于马铃薯单作，根际土壤速效磷降幅最大，达45%以上，土壤pH值明显下降。间作栽培模式改变了马铃薯根际土壤微生物群落结构，降低了根际土壤真菌的数量；间作栽培模式对马铃薯根际土壤微生物群落的碳源利用能力也有明显影响，其中马铃薯间作蚕豆和玉米处理其根际土壤微生物培养120 h的平均颜色变化率分别比对照高13.39%和4.30%。马铃薯根际土壤微生物群落总体上对碳水化合物利用率较高，对芳香化合物的利用率较低。间作蚕豆明显促进了马铃薯根际土壤微生物群落的碳源代谢强度，而且能维持较稳定的产量，因而可能是一种有利于改善马铃薯连作栽培根际微生态环境、缓解连作障碍的栽培模式。

关键词： 间作 连作 根际土壤 平均颜色变化率（AWCD） 碳源

Abstract： To explore feasibilities and mechanisms of different cropping systems alleviating obstacles to mono-cropping of ppotato, a field experiment was carried out, consisting a plot of mono-cropping of potato as CK, a plot of intercropping of potato and corn, a plot of intercropping of potato and broad bean, and a plot of intercropping of potato and buckwheat. Changes in soil nutrient contents and microflora in the rhizosphere of monocropping potato were investigated. Results show that all the three intercropping plots were significantly lower than CK in total nitrogen, total phosphorus, readily available phosphorus and readily available potassium in rhizospheric soil and in soil pH . The decrease in readily available P was particularly significant, reaching at least 45%. Intercropping altered microbial community structure as indicated by significant decrease in the total counts of fungi in the rhizospheric soil. Besides, intercropping also significantly affected carbon source utilization capacity of the rhizospheric microbial community. Especially the intercropping of potato with broad bean and with corn was 13.39% and 4.30% higher than CK in AWCD (average well color development) after 120 hours of incubation of rhizospheric microbes.On the whole, the microbial community in the rhizospheric soil of potato plants in all the treatments was higher in carbohydrate utilization rate, but lower in aromatic compound utilization rate. Intercropping significantly enhanced carbon metabolism of the soil microbial community in the rhizosphere of potato, thus helping sustain stable production of potato. Therefore, intercropping may be used as an approach to improving rhizospheric micro-eco-environment of monocropping potato and alleviating obstacles to potato monocropping.

Keywords： intercropping continuous cropping rhizospheric soil average well color development (AWCD) carbon source

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