

不同肥料对生姜产量及叶片光合作用和叶绿素荧光特性的影响

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Effects of different fertilizers on the photosynthesis, chlorophyll fluorescence characteristics and yield of ginger

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摘要 为探讨生物有机肥对生姜的增产效果, 以‘莱芜大姜’为试材, 研究了不同肥料配比对生姜生长及叶片光合作用和叶绿素荧光特性的影响。结果表明, 增施生物有机肥可显著提高生姜叶片色素含量及净光合速率, 促进生姜生长, 且随生长的进行, 生物有机肥的作用效果日趋明显。生姜旺盛生长期(9月22日), 生物有机肥处理的生姜叶片叶绿素含量分别比普通有机肥及化肥处理高5.5%和13.1%; 叶片净光合速率分别高8.2%和17.8%。尽管各处理生姜叶片的光化学效率在日间高温强光下均降低, 但生物有机肥处理的生姜叶片原初光能转换效率(Fv/Fm)、光合电子传递量子效率(Φ PSII)和光化学猝灭系数(qP)较高, 而非光化学猝灭系数(NPQ)较低, 表明增施生物有机肥可提高生姜叶片光能利用效率。生物有机肥处理的生姜产量分别比普通有机肥及化肥处理高9%和24%左右。

关键词: 生姜 生物有机肥 光合作用 荧光参数 产量 生姜 生物有机肥 光合作用 荧光参数 产量

Abstract:

In order to discuss the effects of bio-organic manure on ginger (*Zingiber officinale* Rosc.) yield, the leaf photosynthesis and chlorophyll fluorescence in different fertilizer treatments were studied in the experiment using the cultivar ‘Laiwu da jian’. The results indicated that bio-organic manure could increase leaf pigment content and photosynthetic rate, and promote the growth of ginger. Moreover, the effects of bio-organic manure improved with ginger growth. For instance, at the vigorous growth stage (22 Sep.), the leaf chlorophyll content of ginger with bio-organic manure application was 5.5% and 13.1% higher than that of common manure and chemical fertilizer, respectively, and the photosynthetic rate was 8.2% and 17.8% higher, respectively. Though the leaf photochemical efficiency of ginger decreased under the condition of high temperature and strong light at noon, the leaf intrinsic photochemical efficiency (Fv/Fm), quantum yield of PS II (Φ PSII) and photochemical quenching (qP) of ginger applied with bio-organic manure were higher than that of common manure and chemical fertilizer, and non-photochemical quenching (NPQ) was lower. This indicated that bio-organic manure could enhance light utilization efficiency of ginger leaves. Yield of ginger with bio-organic manure application was 9% and 24% higher than that of common manure and chemical fertilizer, respectively.

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