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氮肥对水田与旱地烤烟烟叶氮浓度和相关酶活性的影响

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Effects of nitrogen fertilizer on nitrogen concentration and enzyme activities in tobacco leaf in dryland and paddy field

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摘要 试验采用裂区设计,以硝态氮和铵态氮两种氮素形态为主处理,5个供氮水平为副处理,在大田条件下研究了水田与旱地烤烟在团棵、旺长、脚叶采烤、腰叶采烤和顶叶采烤等5个生育期烟叶的总氮浓度、硝酸还原酶和谷酰胺合成酶活性的氮肥效应。结果表明,水田与旱地烤烟在各氮肥处理下团棵期烟叶的氮浓度最高,旺长期稍有下降,至脚叶采烤期则迅速降低;烟叶中的硝酸还原酶和谷酰胺合成酶活性从团棵到旺长期迅速升高,进入采烤后逐渐降低。水田烤烟烟叶总氮浓度和硝酸还原酶活性比旱地烤烟大,而谷酰胺合成酶则水田小于旱地,说明烤烟在水田状况下吸氮能力比旱地烤烟强;然而水田烤烟氮同化能力比旱地烤烟弱。试验结果还表明,水田与旱地烤烟烟叶的总氮浓度、硝酸还原酶和谷酰胺合成酶活性分别在0.9～0.kg/hm^{2}和0.7～5.kg/hm^{2}范围内随施氮量的增加而提高;由于土壤中铵态氮的转化与硝态氮淋溶损失,导致铵态氮的肥效优于硝态氮。

关键词: 氮肥 水田 旱地 烤烟 酶活性 氮肥 水田 旱地 烤烟 酶活性

Abstract: Tobacco is mainly planted in dry land and paddy field in Yunnan.Although effects of nitrogen fertilizer on nitrogen accumulation and nitrate reductase in tobacco leaf had been extensively studied,impacts of nitrogen fertilizer on flue-cured tobacco leaf nitrogen metabolism in dry land and paddy field were not well documented.It is important to understand differences of tobacco leaf nitrogen metabolism,such as nitrogen concentration and its key enzyme activity variation during different tobacco growth stage after nitrogen treatments,in dry land and paddy field in order to improve yield and quality of tobacco leaf.In this study,the response of tobacco leaf nitrogen concentration,nitrate reductase (NR),and Glutamine synthetase(GS) to nitrogen fertilizer was investigated at five growth stages including rosette growth stage,rapid growth stage,lower stalk position leaf harvesting stage,middle stalk position leaf harvesting stage, and upper stalk position leaf harvesting stage.Split plot design with the two nitrogen forms,namely nitrate nitrogen and ammonium nitrogen,as main plots,five nitrogen levels,namely 0,37.5,75,112.5,150 kg/ha in dry land and 0, 45, 90,135,180 kg/ha severed as split plot,was adopted in the experiment.Results showed that the peak value of nitrogen concentration in tobacco leaf was always showed up at rosette growth followed by rapid growth stage.However,leaf nitrogen concentration reduced rapidly once tobacco leaf harvesting began.The NR and GS in leaf increased at rosette growth stage to rapid growth stage,and then decreased gradually in dry land and paddy field after nitrogen fertilizer application.Tobacco leaf nitrogen concentration and NR activity in paddy field was much higher than that in dry land.However,leaf GS activity in dry land was higher than that in paddy field.The result indicated that tobacco in paddy filed was able to utilize nitrogen fertilizer more efficiently,but its nitrogen assimilation ability was much weaker than that in dry land.When the nitrogen fertilization rate ranged from 0 to 75 kg/ha in dry land and 0 to 90 kg/ha in paddy field,application of nitrogen could improve leaf nitrogen concentration,NR,and GS activities.Ammonium nitrogen had greater positive effect on nitrogen uptake NR,GS,and AS activities comparing to nitrate nitrogen.

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