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草甘膦对转EPSPS-G6基因棉花种质系配子育性的影响

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Effect of Glyphosate on the Gamete Fertility of Transgenic Glyphosate-resistant Cotton Germplasms with *EPSPS-G6*

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摘要 以转*EPSPS-G6*基因的抗草甘膦棉花种质系为材料，研究转基因抗草甘膦棉花植株现蕾后喷施不同浓度草甘膦后的花器形态结构和配子育性的影响。结果表明，苗期的草甘膦处理对转*EPSPS-G6*基因的棉花种质系植株生长发育无明显的影响，但现蕾后可导致转基因抗草甘膦棉花种质系花冠变小，花丝变短，柱头变长，花药皱缩、不能开裂，呈雄性败育的特征；高浓度（>30 mmol · L^{-1}）草甘膦处理尤其明显。花粉粒育性鉴定结果表明，草甘膦处理15～20 d后转基因植株的花朵雄配子即完全败育，其中，低浓度（<20 mmol · L^{-1}）下完全败育的时间为20 d，高浓度（>30 mmol · L^{-1}）下完全败育的时间为15 d。低浓度草甘膦处理的花粉粒的完全败育持续时间约20 d，高浓度草甘膦处理完全败育的持续时间更长。不同间隔时间喷施草甘膦的试验结果表明，间隔20 d喷一次草甘膦，即可在首次喷药20 d后保持完全不育。考虑到气候等因素，转基因抗草甘膦棉花可在现蕾初期喷施20 mmol · L^{-1}的草甘膦，每隔15 d（遇特殊气候可延长5 d）喷1次,共喷4次，即可进行不去雄杂交棉制种。

关键词： 草甘膦 杀雄剂 杂交制种 不育机理

Abstract： The effect of glyphosate on floral organ morphology structure and gamete fertility of transgenic glyphosate-resistant cotton germplasms with *EPSPS-G6* were studies, with the germplasms were treated with different glyphosate concentration started from squaring stage. The results showed that there were not obvious damage on the growth and development of the transgenic germplasms by the treatment of glyphosate before squaring stage, but serious flower characters and male sterility, such as small flowers, short stigmas, wizened and indehiscent anthers etc., when they were treated with glyphosate after squaring stage，especially with the high concentration(>30 mmol · L^{-1}). Pollen fertility identification showed that male gametes abortion was started in 15 days for high concentration, or 20 days for low concentration(<20 mmol · L^{-1}) after the treatment. The period of male gametes abortion continued for more than 20 days，and much longer for the higher concentration glyphosate. The results of different treatment intervals with different concentrations showed that male gametes abortion could continue in the whole growth period when they were treated every 20 days. The experiment result found that the transgenic cotton germplasms with *EPSPS-G6* could be used as female parent without artificial emasculation to produce hybrid cottonseeds, as long as they were treated by 20 mmol · L^{-1} glyphosate with every 15 days（another 5 days delay if the weather was unallowed for spraying） for 4 times, started from squaring stage.

Keywords： glyphosate male killing agent hybrid seed production sterile mechanism

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