

研究论文

转大麻哈鱼生长激素基因鲤生态安全性检测与分析

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摘要 评价了转大麻哈鱼(*Oncorhynchus Suckley*)生长激素基因鲤生态安全性问题及研究转基因鱼对天然野生鲤群体遗传污染程度。通过RAPD和SSLP方法,用265个RAPD标记和35对鲤的微卫星标记对受杂交鲤污染的哈尔滨江段黑龙江鲤群体、未受污染的抚远江段黑龙江鲤群体及模拟转基因鲤占普通鲤群体的1%和10%比例获得繁殖子代等实验群体的DNA样本进行全基因组扫描统计分析得出结论,即转基因鲤占普通鲤群体1%时对普通群体的基因污染程度是微乎其微的,远远低于杂交鲤对野生群体基因污染,转基因鲤占普通鲤群体10%时对普通鲤遗传背景的影响稍有升高,但仍然远远低于杂交鲤对野生群体基因污染程度。总之,在现有的检测技术条件及有效的监控条件下,与杂交鲤相比转基因鲤对野生群体的遗传背景的影响是微弱的,而外来种和杂交种则对生态环境有严重威胁。

关键词 [大麻哈鱼生长激素基因](#); [鲤](#); [生态安全](#); [基因污染](#)

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Ecological safety assessment of the transgenic carp containing a growth hormone gene using genetic markers

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Abstract Transgenic organism contains modified genes, including genes from other species. The escape or introduction of transgenic organisms into a natural environment poses a major ecological concern. Purdue University researchers Willian and Richard have found that introduction of a transgenic fish to the wild could damage native populations, even to the point of extinction. Such environmental risk should be evaluated before releasing every transgenic animal into a wild environment. Here we report a risk assessment of releasing the transgenic carp bearing the brevoort growth hormone gene into a natural population using a panel of 265 RAPD markers and 35 microsatellite markers. This risk assessment was based on detecting population genetic background changes and comparing these changes with the hybrid carps that may also present a latent threat to native wildlife. In this study, we have chosen seven experimental groups that are Heilong River carps inside Harbin section, Heilong River carps inside Fuyuan section, Heilong River carps inside Songhua River, two fry groups that one or ten percent transgenic carps were mixed with common carps respectively, and two equivalent fry groups as controls. All groups were bred under similar environment to minimize other variables. The transgenic carps were produced by inserting a gene const

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ruct of salmon growth hormone driven under the salmon growth hormone promoter into genome
s of common carps. Heilong River carps inside Harbin section represented a population pollute
d by hybrid carps. The group of Heilong River carps inside Fuyuan section served as a natural gr
oup as it is away from cities and artificial nurseries, and grows mostly in the wild. Through genom
e wide scanning of every experimental group and statistical analysis, we found the frequency of co
rrelation between transgene and heterozygosity is 0.02. P value of heterozygosity of Heilongjian
g carps inside Harbin is 0.08 which is significant. Based on these results, we concluded that the ex
ogene pollution in both groups in which one or ten percent transgenic carps were mixed is signific
antly lower than that of the hybrid carps to the natural carps. These data suggested that the ecolog
ical risk of growth-hormone transgenic carps is less than the hybrid carps. The transgenic carps co
uld not cause serious gene pollution to the natural carps unless a large number of transgenic carp
s escaped or released to the natural environment. Although we must try our best not to release an
y non-natural organism especially transgenic organism to the wild, it is necessary to analyze the ris
k of accidental releases. In this study, our data suggested that the hazard of transgenic organisms t
o wildlife is not greater than exotic and hybrid species. The natural world seemed not as rigid a
s we had thought, and complex genetic resources could neutralize the influence of a transgene.

Key words [brevoort](#) [growth](#) [hormone](#) [gene](#) [common](#) [carp](#) [ecological](#) [safety](#) [gene](#) [pollution](#)

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