

饲养东北虎的微卫星变异研究 Genetic Diversity of Microsatellite Loci in Captive Amur Tigers

张于光^{1,2}, 李迪强³, 肖启明², 饶力群³, 张学文³ ZHANG Yu-Guang^{1,2} LI Di-Qiang¹ XIAO Qi-Ming² RAO Li-Qun³ ZHANG Xue-Wen³

1. 中国林业科学研究院森林生态环境与保护研究所, 北京, 100091; 2. 湖南农业大学生物安全科技学院, 长沙, 410128; 3. 湖南农业大学理学院, 长沙, 410128 1. Institute of Forestry Ecology, Environment and Protection, Chinese Academy of Forestry, Beijing 100091, China; 2. College of Biosafety Science and Technology of Hunan Agricultural University, Changsha 410128, China; 3. College of Sciences of Hunan Agricultural University, Changsha 410128, China

收稿日期 修回日期 网络版发布日期 接受日期

摘要

东北虎是世界上濒危动物之一, 具有极其重要的研究价值和保护意义。该研究利用10个在东北虎基因组中表现多态性的微卫星基因座 (Fca005, Fca075, Fca094, Fca152, Fca161, Fca294, Pti002, Pti003, Pti007和 Pti010) 对113只饲养东北虎进行了遗传多样性检测。用非变性聚丙烯酰胺凝胶电泳检测微卫星的PCR扩增产物, 计算了10个微卫星基因座的等位基因频率、基因杂合度、多态信息含量和有效等位基因数。在113只东北虎样品中, 10个基因座的等位基因数为3~6个, 其中Fca152最多; 等位基因频率处于0.009~0.767之间。基因杂合度值在0.385~0.707间, 平均为0.616, 多态信息含量值在0.353~0.658间, 平均为0.558, 有效等位基因数处于1.629~3.409之间, 平均为2.784, 表明所选用的10个微卫星基因座在研究样品中均为中高度多态性基因座, 具有比较明显的遗传变异。113只样品中包括75只毛发样品, 23只血液样品和15只组织样品, 不同样品的结果比较表明, 毛发、血液和组织样品均可以得到清晰的扩增结果。所以, 微卫星基因座与非损伤性DNA分析方法可以成功地应用于濒危珍稀动物的遗传多样性研究。

Abstract: The tiger is one of the most threatened wildlife species since the abundance and distribution of tiger have decreased dramatically in the last century. The wild Amur tiger (*Panthera tigris altaica*) only distributed in northeast China, the far east area of Russia and the north Korea and its size of wild population is about 450 in the world and 20 in China. Several hundred captive populations of Amur tigers are the main source to protect gene library of tiger and the source of recovering the wild populations. The Breeding Center for Felidae at Hengdaohezi and Ha'erbin Tiger Park in Heilongjiang Province is the biggest captive breeding base in China. How to make clear the genetic pedigree and establish reasonable breeding system is the urgent issues. So we use the microsatellite DNA markers and non-invasive technology to research on the genetic diversity of captive Amur tiger in this study.

Ten microsatellite loci (Fca005, Fca075, Fca094, Fca152, Fca161, Fca294, Pti002, Pti003, Pti007 and Pti010), highly variable nuclear markers, were studied their genetic diversity in 113 captive Amur tigers. The PCR amplified products of microsatellite loci were detected by non-denatured polyacrylamide gel electrophoresis. Allele numbers, allelic frequency, gene heterozygosity (He), polymorphism information content (PIC) and effective number of allele (Ne) were calculated. 41 alleles were found and their size were ranged from 110bp to 250bp in ten microsatellite loci, Fca152 had 6 alleles, Fca075, Fca094 and Fca294 had 5 alleles, Fca005 and Pti002 had 4 alleles and the others had 3 alleles in all tiger samples, respectively. The allelic frequencies were from 0.009 to 0.767; The He ranged from 0.385 to 0.707, and Fca294 and Pti010 locus had the highest and lowest value; the PIC were from 0.353 to 0.658, Fca294 and Pti010 locus had the highest and lowest value; and Ne were from 1.626 to 3.409, Fca294 and Pti010 locus had the highest and lowest value, which showed the ten microsatellite loci had high or medium polymorphism in these Amur tigers and had high genetic diversity. At the same time, we only found even bases variability which showed the even bases repeat sequence (CA/GT) maybe the basic unit for length variability of microsatellite in all loci.

In this study, the samples were made up of 75 hair specimens, 23 blood specimens and 15 tissue specimens, we obtained the genome DNA from hairs using the non-invasive DNA technology and demonstrated that DNA derived from hair samples is as good as that obtained from blood samples for the analysis of microsatellite polymorphism. These results imply that microsatellite DNA markers and non-invasive DNA technology can help study the genetic diversity of Amur tiger. This method could be used in the captive management of other endangered species.

关键词 [东北虎](#) [微卫星基因座](#) [遗传变异](#) Key words [Amur tiger](#) [microsatellite locus](#) [genetic diversity](#)

分类号

扩展功能

本文信息

- ▶ [Supporting info](#)
- ▶ [PDF\(0KB\)](#)
- ▶ [\[HTML全文\]\(0KB\)](#)
- ▶ [参考文献](#)

服务与反馈

- ▶ [把本文推荐给朋友](#)
- ▶ [加入我的书架](#)
- ▶ [加入引用管理器](#)
- ▶ [复制索引](#)
- ▶ [Email Alert](#)
- ▶ [文章反馈](#)
- ▶ [浏览反馈信息](#)

相关信息

- ▶ [本刊中 包含“东北虎” 的相关文章](#)
- ▶ [本文作者相关文章](#)

· [张于光](#)

· [李迪强](#)

· [肖启明](#)

· [饶力群](#)

· [张学文ZHANG Yu-Guang](#)

· [LI Di-Qiang XIAO Qi-Ming RAO](#)

[Li-Qun ZHANG Xue-Wen](#)

Abstract

Key words

DOI:

通讯作者