[an error occurred while processing this directive]

生物多样性
Biodiversity Science
ISSN 1005-0094
CN11-3247/Q
主办 中国科学院生物多样性委员会 中国植物学会
中国科学院植物研究所 动物研究所 微生物研究所

生物多样性 » 2011, Vol. 19 » Issue (01) :106-112 DOI: 10.3724/SP.J.1003.2011.07124

被子植物早期近交衰退与晚期自交不亲和

郝祎祺* 赵鑫峰

北京师范大学生命科学学院, 北京 100875

Distinguishing early-acting inbreeding depression from late-acting ovar-ian self-incompatibility

Yiqi Hao*, Xinfeng Zhao

College of Life Sciences, Beijing Normal University, Beijing 100875

摘要 被子植物自交后结籽率的降低通常由早期近交衰退(early-acting inbreeding depression)与晚期自交不亲和(self-incompatibility)导致。早期近交衰退是严格的合子后的作用机制, 通常由多位点隐性有害基因的纯合导致, 并在合子发育成成熟种子的过程中发生。发生在柱头表面或花柱中的自交不亲和是合子前的作用机制, 而发生在子房内的晚期自交不亲和(late-acting ovarian self-incompatibility)可在合子前或合子后发生作用, 与早期近交衰退很难区分。在合子前的子房内自交不亲和机制下, 尽管花粉管能生长到子房甚至穿透胚珠, 但通常不能形成合子。合子后的子房内自交不亲和能形成合子, 但由于自交不亲和通常由单位点控制, 合子败育集中发生在受精作用后的很短时间内。基于早期近交衰退和子房内自交不亲和的这种差异, 已有研究提出了8种区分方法。通过解剖学方法观察授粉后生物学过程, 比较自交和异交先后授粉和自交授粉处理的结籽率, 以及通过一元线性回归模型考察自交和异交处理下成熟种子和败育种子数之和是否保持恒定, 可以区分是合子前还是合子后过程导致的自交后种子产量降低。通过全同胞间杂交实验判断败育的遗传基础是单基因控制还是多位点有害隐性等位基因的纯和, 可以区分合子后自交不亲和机制与早期近交衰退; 或者通过这两种不同遗传基础导致的种子大小等表型性状的差异来区分。

关键词: 早期近交衰退 晚期自交不亲和 合子前 合子后 遗传负荷

Abstract: Reduced seed yields after self-pollination are generally thought to be induced by early-acting in-breeding depression and self-incompatibility. Early-acting inbreeding depression occurs strictly post-zygoti- cally, and leads to the abortion of progeny that are homozygous for deleterious recessive alleles at an early stage of seed maturation. Late-acting ovarian self-incompatibility, on the other hand, may be either pre- or post-zygotic, and usually only one locus is responsible for the rejection. In the pre-zygotic late-acting self-incompatibility, the selfed pollen tube may grow to the ovary or penetrate the ovule, but cannot fertilize the ovule. Post-zygotic self-incompatibility, referred to as an abortion, occurs shortly after fertilization, and is a result of the interaction between the maternal plant and the zygotes. Based on differences between these two phenomena, eight methods have been proposed to distinguish between them. Three of them are used to identify the timing of the abortion, pre- or post-zygotic, including anatomical observation, comparison be-tween the seed set following self-pollination and chase-pollination, and using linear regression models to test whether the sum of mature and aborted seeds remains constant. The key to distinguishing post-zygotic self-incompatibility from early-acting inbreeding depression is to judge whether the reduction in seed yield after self-pollination is controlled by a single locus or the expression of deleterious alleles involving multiple loci, or to focus on the phenotypes associated with these two genetic basis.

Keywords: early-acting inbreeding depression late-acting self-incompatibility pre-zygotic post-zygotic genetic load

Received 2010-05-10; published 2011-01-20

Fund:

国家大学生创新性实验计划

Corresponding Authors: 郝祎祺 Email: haoyiqi@yahoo.cn

引用本文:

郝祎祺, 赵鑫峰.被子植物早期近交衰退与晚期自交不亲和[J] 生物多样性, 2011,V19(01): 106-112

Yiqi Hao, Xinfeng Zhao .Distinguishing early-acting inbreeding depression from late-acting ovar-ian self-incompatibility[J] Biodiversity Science, 2011,V19(01): 106-112

链接本文:

http://www.biodiversity-science.net/CN/10.3724/SP.J.1003.2011.07124 **或** http://www.biodiversity-science.net/CN/Y2011/V19/I01/106