

研究论文

¹²C重离子束辐照对油菜 (*Brassica napus*) 的影响

官梅, 李梅

湖南农业大学, 湖南长沙410128

收稿日期 2005-7-18 修回日期 网络版发布日期 接受日期 2006-1-14

摘要 重离子束是一种新型辐照源, 它对油菜的影响以往研究较少。本文报道了30 Gy、50 Gy和80 Gy ¹²C重离子束辐照对油菜M₁和M₂生育期、植物学性状、品质性状, 根尖和花粉母细胞的染色体行为和DNA分子多态性等方面的影响。结果表明: 50 Gy和80 Gy辐照处理可引起油菜生育期提早, 生长繁茂, 部分植株发生变异, 出现瘤状根、矮茎、淡绿匙形叶, 多雌蕊花, 双生角果和黄籽株等。80 Gy辐照处理使油菜种子含油量有不同程度提高, 并出现油酸含量高于70%以上植株。30~80 Gy辐照处理, 使根尖染色体和花粉母细胞染色体产生畸变, 畸变类型有微核、小核、异常四分体、染色体桥、落后染色体、断片等, 其中以微核细胞最多, 且辐照剂量愈大畸变率愈高。50 Gy和80 Gy辐照处理对油菜DNA分子有影响, RAPD分析表明, 用40个引物对处理后油菜进行扩增, 共扩增出43个DNA片段, 表明不同处理植株存在一定多态性。

关键词 [¹²C重离子束](#) [电离辐照](#) [油菜](#)

分类号 [S565](#)

Effect of ¹²C Heavy Ion Beams Irradiation on Rapeseed (*Brassica napus*)

GUAN Mei, LI Xun

Hunan Agricultural University, Changsha 410128, Hunan, China

Abstract ¹²C heavy ion beam is a kind of new irradiation source. Compared with the physical mutation, such as γ ray and X ray treatments, ¹²C heavy ion beam are much better in physiological, biological and chemical effects with higher mutation rate, wider mutational spectrum and stability easier to be get. It arouses people's attention in recent years. There are some reports of ¹²C heavy ion beam treatments on paddy, wheat and maize, but a few on rapeseed. Our objectives were to investigate ¹²C heavy ion beam influence on rapeseed morphological characteristics, seed quality, chromosome and DNA molecular aberrations using original Xiangyou 15 (*B. napus*) seeds with these treatments of 30 Gy, 50 Gy and 80 Gy. The growing period duration was earlier, the rape plants grew luxuriously with larger leaves (Table 1 - Table 4) and the agronomic characters were improved in the treatments of 50 Gy and 80 Gy. Some plants were mutated showing tumor-like roots, dwarf stems, light green spoon leaves (Fig.1), multipistil flowers, multi-siliquae (Fig.2) or yellow seed (Table 5). Treatment of 80 Gy ¹²C heavy ion beams irradiation increased oil content in different degrees. The oleic acid content of some plants was more than 70%. There were root tip chromosome aberration and pollen mother cell chromosome aberration under 30 Gy, 50 Gy and 80 Gy ¹²C heavy ion beams irradiation. The aberration type included micronucleus (Fig.3), mininucleus (Fig.4), abnormal tetraspore (Fig.5), chromosome bridge (Fig.6), lagging chromosome (Fig.7-1, Fig.7-2, Fig.7-3) and fragment. Most of aberration cells were with micronucleus. The aberration percentage was increased with increasing irradiation dosage (Table 7, Table 8). RAPD analysis using 40 random primers proved that treatments of 50 Gy and 80 Gy ¹²C heavy ion beams irradiation had some effects on DNA of rapeseed. Forty-three DNA fragments were amplified and showed the polymorphism in a certain degree in different dosage treatments. The relative biological effect (RBE) was higher and the mutation was more difficult to be repaired by the plant with a high and stable mutation percentage. The results suggest that mutation induced by ¹²C heavy ion beam irradiation will be very useful in rapeseed breeding. Our previous studies showed crucifer is insensitive to irradiation because their seeds have propylene mustard oil as a barrier to irradiation. So, ¹²C heavy ion beam irradiation dosage should be increased suitably to rapeseed if we want to get more mutation.

Key words [¹²C heavy ion beams](#) [Irradiation](#) [Rapeseed](#)

DOI:

扩展功能

本文信息

▶ [Supporting info](#)

▶ [PDF\(948KB\)](#)

▶ [\[HTML全文\]\(0KB\)](#)

▶ [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“¹²C重离子束”的 相关文章](#)

▶ 本文作者相关文章

· [官梅](#)

· [李梅](#)

