

3 - 56 Phenotypic Analysis of a Carbon Ion Irradiation-induced Mutant of *Arabidopsis thaliana*

Du Yan, Yu Lixia, Zhou Libin, Chen Gang, Luo Shanwei, Liu Qingfang and Li Wenjian

Mutants are widely used in plant science, especially in plant genetics, physiology, and plant breeding. Mutations are mainly generated by methods as follows: spontaneous mutation, chemical mutagens, and physical mutagens. In this research, dry seeds of *Arabidopsis thaliana* (ecotype Columbia) were irradiated by 80 MeV/u carbon ions with dosage of 100, 200, 300, 400, 500 and 600 Gy. M1 seeds were grown in the greenhouse room with the condition of 22 °C and 70% relative humidity under continuous illumination of 5000 lux. Before mutation screening, the radio biological effects of carbon ions on *Arabidopsis thaliana* were investigated. 200 Gy was chosen to be the suitable dose for large scale mutation screening. The mutant numbered 488[#] was isolated from 28602 M2 plants by its morphological abnormalities.

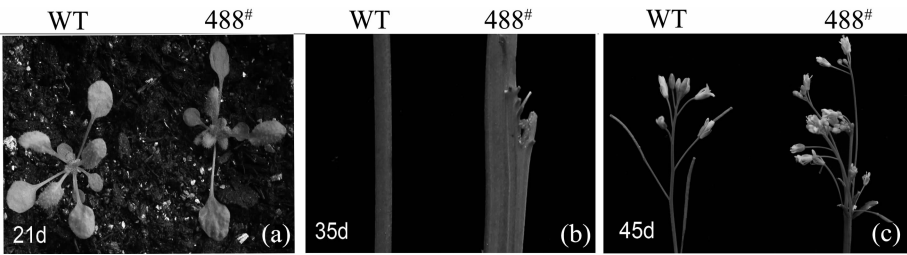


Fig. 1 The morphological characteristics in different growth phases of WT and mutant 488[#].

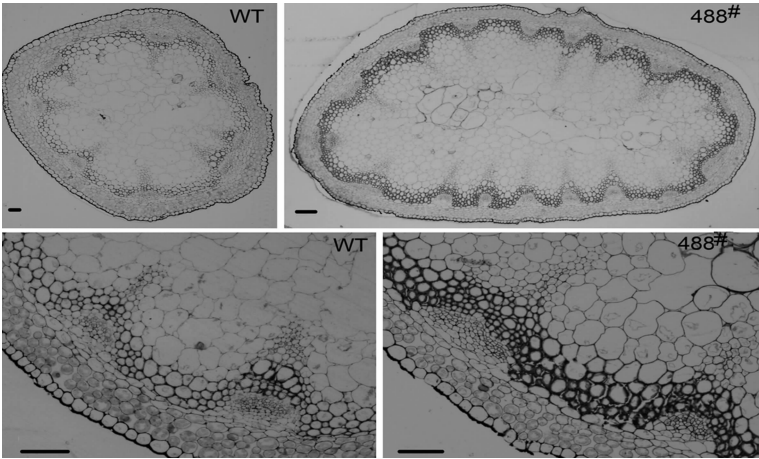


Fig. 2 The cross section of stems of WT and mutant 488[#]. Scale bars, 50 μm.

In order to investigate the discrepancies between wild type(WT) and 488[#], photos of 3 different stages of both materials were photographed. Fig. 1(a) shows that in the early stage, the mutant 488[#] showed longer petioles in the leaves at the bottom than those of WT plants. However, the petioles of young leaves are shorter than those of WT. Fig. 1(b) shows that in the later stage, the thick and flattened stems are observed in mutant 488[#] (Fig. 1(b)). When the reproductive growth period, the 488[#] mutant displays conspicuous irregular branching pattern and fused organs, furthermore, the development of flower is also affected, especially the petals show irregular numbers. In brief, fasciation affects stems, leaves and even flowers and siliques (Fig. 1(c)); all these characteristics make the 488[#] mutant form a brush-like structure.

The most conspicuous mutant phenotype of 488[#] is the flattened stem; therefore the anatomical analysis of stems was carried out. Fig. 2 shows the results of technovit rein semi-thin section of stems of WT and mutant. Compared to WT, the cross section of stem of 488[#] is oval; the number of vascular bundle is much more. As for each individual vascular bundle, the cell wall of 488[#] seems much thicker than those of WT; meanwhile, the mutant shows a higher-cell-density with reduced cell volume.