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GAMMA-RAY INDUCED MUTATION BREEDING FOR SPEEDY RICE IMPROVEMENTS

New demands for various traits are arising in plant breeding. Gamma-ray irradiation can correspond to these demands promptly by adding valuable traits to leading varieties more easily. In Japan low beta-carotene and low lignin contents are favorable for rice whole crop silage (WCS). For food and animal feed rice, glabrous glume is desirable for reducing storage cost by decreasing storage space required in country elevators. We irradiated the seeds of WCS high yielding rice variety 'Tachisugata'with gamma-ray. Mutants with yellow-green leaf blades known to have low beta-carotene were selected from about 2,500M2 lines. The mutants decreased their yields by 6.0 to 9.5%. Around 40% of the beta-carotene decreased mutants were selected and developed within three years. A gold hull mutant known to have a morphological low lignin content was selected from about 7,000M2 plants. It took two years to develop it. This trait was obvious only just after panicle emergence. The lignin content in M3 was 22% lower than in 'Tachisugata'. Whole-genome resequencing revealed that a causable mutation was a missense on *GH2*. Although the mutant decreased its yield by 5.6 to 7.0%, lodging resistance was comparable to 'Tachisugata'. Furthermore, another mutant with glabrous glume was selected from about 1,900M2 plants of high yielding rice variety 'Oonari'within one year. Also, mutants with reduced hair were selected from about 800M3 lines and over 10,000M2 plants of the leading variety 'Koshihikari'known for good eating quality. Gamma-ray irradiation can promptly add new traits to original leading varieties. It is known that the number of deleterious mutations induced by gamma-ray is few in whole rice genome, which is favorable for the rapid selection of mutants that are almost identical to the original elite varieties.

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