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Stability and inheritance of photoperiod-sensitive genic male sterility in rice

In 1973, a photoperiod-sensitive genic male-sterile plant was discovered in "Nongken 58." It is male sterile under long day conditions and fertile under short day conditions. Under the natural photoperiod in Wuhan, plants heading before September 2 are male sterile, showing typical pollen abortion. The fertility is gradually restored after September 2. About 50% of pollen grains are normal after September 6. F₁ using 30 different varieties was fertile regardless of daylength, F₂ segregated into 3 fertile: 1 sterile types under long day condition in some crosses, less clearly in other crosses. It is concluded that photoperiod depending male sterility is monogenic recessive inherited with some influence of modifier genes. Any normal variety can be used as restorer, therefore strong heterosis combinations can easily be bred.

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Molecular analysis of waxy mutants in rice

The "waxy" gene is a structural gene coding a glycosyl transferase which synthesises amylose in the endosperm tissue. "Non-waxy" rice cultivars have an active gene and their amylose content is 18-25% depending upon gene performance and modifier genes. In "waxy" rice, no amylose is found because the enzyme is absent. In mutants induced by gamma rays, neutrons, EI or EMS, amylose content ranged from 0 to 20%, i.e. there are intermediate phenotypes as well. Some of them had the same amount of the enzyme as a "non-waxy" cultivar, even fully "waxy" mutants showed a certain amount of the enzyme. This suggests that in mutants there may be no structural change in the enzyme gene but the enzyme produced might be less active. By molecular analysis of the mutants' genes it was found that only two mutants induced by thermal neutrons show structural alterations, the changes in other mutants are either too small to be detected by Southern analysis or are outside the structural gene in question.

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Inheritance and gene expression of a root-growth inhibiting mutant in rice (*Oryza sativa* L.)

A root-growth inhibiting mutant was induced in the dwarf mutant line, "Fuhei 71" through ethylene-imine. The mutant is characterised by the excessive inhibition of both seminal and crown roots elongation just after germination, although its shoots grow nearly normal. To study the genetics, the mutant was crossed with its original line "Fuhei 71" and some other normal cultivars. Results show that the root-growth inhibition is controlled by a recessive gene (rt), independent of the dwarf gene, d-50(t) locus in "Fuhei 71". For elucidating the gene action on root morphogenesis, histological and cytological experiments were carried out using a longitudinal and transverse thin section of seminal and/or crown root tips. Observations suggest that the rt gene affects the normal formation of the epidermal system which is differentiated from the protoderm of the root apical meristem.

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