New symbiotic mutants of pea obtained after mutagenesis of line SGE

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Isolation and study of symbiotically abnormal genotypes of legume plants is a potentially useful approach for understanding plant genetic control of legume-Rhizobium symbiosis. Experimental mutagenesis is a practical method for obtaining such genotypes. Symbiotic mutants of pea have been generated in several laboratories (2, 3, 4, 13). Earlier we reported the isolation of symbiotic mutants after mutagenesis of laboratory line Sprint-2 (1). We now report on several new symbiotically abnormal genotypes obtained after EMS mutagenesis (0.15% EMS during 10 h) of laboratory line SGE (7).

Eight symbiotic mutants were isolated. Two of them (SGEFix$^-$-1 and SGEFix$^-$-2) form ineffective nodules on the roots. The other six (SGENod$^-$-l, SGENod$^-$-2, SGENod$^-$-3, SGENod$^-$-4, SGENod$^-$-5 and SGENod$^-$-8) are unable to form nodules at all. The frequency of symbiotic mutations comprised 1.2% (8 mutants in 638 M_2 families). Monogenic recessive inheritance has now been shown for all the above mutants except SGENod$^-$-4.

Allelism tests revealed that mutants SGEFix$^-$-l and SGEFix$^-$-2 are non-allelic to each other and to mutant lines E135f (6) and Sprint-2Fix$^-$ (1). The mutant SGEFix$^-$-2 is also non-allelic to mutant FN1 (11).

After inoculation with an effective Rhizobium strain, line SGEFix$^-$-l forms small white nodules lacking nitrogenase activity. The number of nodules is about two-fold that of the initial line. The morphology of SGEFix$^-$-2 nodules can be subdivided into several types: white small, white tumour-like with small dark pit on the distal part, pink tumour-like, and green tumour-like. Symptoms of nitrogen deficiency when SGEFix$^-$-2 is grown, on nitrogen-free mineral solution after inoculation with effective Rhizobium allow us to make a preliminary conclusion about the lack of nitrogenase activity.

Allelism tests show that the mutant genes of lines SGENod$^-$-2, SGENod$^-$-3, SGENod$^-$-8 are non-allelic to each other and to *sym9* (12), *sym10* (12), and *sym19* (10, 12). Mutant SGENod$^-$-2 is also non-allelic to E69 (*sym7*) (8), R25 (*sym8*) (9), K_5 (*sym12*) (10) and P2 (12); mutant SGENod$^-$-3 is non-allelic to E2 (*sym5*) (5) and R25 (*sym8*); and mutant SGENod$^-$-8 is non-allelic to R25 (*sym8*), K_5 (*sym12*) and P2.

Additional allelism tests are necessary to fully determine in which loci (new or described earlier) the mutations in the above-listed lines have happened. Further investigation of the mutant phenotypes and inheritance of the mutations in these lines will allow us to describe the symbiotic defects and the mutant genes in more detail.

Acknowledgements. This work was supported financially by the State Research Program INTERBIOAZOT-2000, the Russian State Program Frontiers in Genetics, the International Science Foundation #R6K000, and the Russian Fund of Fundamental Research.

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