MUTANTS DEFECTIVE IN SYMBIOTIC NITROGEN FIXATION

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Variants in the symbionts are required to delineate the steps in the process of nodule formation and function. Using EMS and gamma radiation, we induced mutants of the pea cultivar 'Sparkle' which are defective in nodulation (2). We previously reported four loci (sym-5, sym-7, sym-8, and sym-9) controlling non-nodulation in these mutants (3). We have since obtained additional mutants by neutron radiation. Two monogenic recessive mutations, in selections N15 and N24, are not nodulated by any strain of Rhizobium leguminosarum tested, and are not allelic with those previously described. We designate these loci as sym-10 and sym-11.

Jacobsen (1) obtained EMS-derived mutants of cv. 'Rondo'. The gene controlling defective nodulation in his selection K5 is non-allelic with our mutants, and is designated sym-12.

Although line E135 was selected in the M2 generation as a nodulating but non-fixing plant, its M3 progeny segregated both non-nodulating and nodulating, non-fixing plants. The non-fixing segregant forms abundant small, white nodules lacking nitrogenase (acetylene reduction) activity. In crosses between wild-type and a true-breeding pure-line, nodulating, non-fix line, the F2 segregated 3:1 fix:non-fix. The gene controlling the fixation phenotype is designated sym-13. The F2 progeny of the non-nodulating egregant crossed with its wild-type parent, Sparkle, segregated for both nodulation and fixation, indicating the non-nod line also carried alleles for non-fixing. Allelism tests are in progress involving this non-nod segregant and other non-nodulating lines.

1. Jacobsen, E. 1984. Plant and Soil 82:427-438.
2. Kneen, B. E., T. A. LaRue, and N. Weeden. 1984. PNL 16:31-34.
3. Kneen, B. E. and T. A. LaRue. 1986. PNL 18:33.

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